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OVERSIGHT ON NIOSH: EDUCATIONAL RESOURCE CENTERS

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HEARING

BEFORE THE

SUBCOMMITTEE ON HEALTH AND SAFETY

OF THE

COMMITTEE ON EDUCATION AND LABOR
HOUSE OF REPRESENTATIVES

NINETY-NINTH CONGRESS

FIRST SESSION

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OVERSIGHT ON NIOSH: EDUCATIONAL RESOURCE CENTERS

TUESDAY, JUNE 18, 1985

House of Representatives,
Subcommittee on Health and Safety,
Committee on Education and Labor,
Washington, DC.

The subcommittee met, pursuant to call, at 9:30 a.m., in room 2257, Rayburn House Office Building, Hon. Joseph M. Gaydos (chairman of the subcommittee) presiding.

Members present: Representatives Gaydos and Hayes.

Staff present: Sy Holzman, deputy staff director; and Lee Bassford, staff assistant of the Subcommittee on Health and Safety; and Dorothy L. Strunk, minority senior legislative associate of the Committee on Education and Labor.

Mr. Gaydos. The committee will be in order.

I have an opening statement, and then we will proceed.

There is no question that there is a national need for more and better trained professionals in the fields of occupational health and safety. Testimony at previous hearings has indicated that well-trained personnel are quickly hired by private industry as well as Federal, State and local governments.

In fact, a recent survey by the National Institute for Occupational Safety and Health indicated that the annual number of graduates was only about 15 percent of the demand for qualified occupational health and safety professionals in this country.

The Educational Resource Centers located at 15 regional public and private universities in 14 States are a principal source for these qualified personnel.

The centers, established under the authority of the OSH Act in 1970, began activities in 1977. Grant funds to help support the ERC program come from NIOSH. The centers offer tuition and stipend support to deserving graduate students for study in occupational medicine, occupational health nursing, industrial hygiene and safety sciences.

In addition, the centers also offer continuing educational courses to help maintain and upgrade the competence of occupational health and safety professionals already in the field.

The resource centers perform two other valuable services as well. They work closely with their regions to help industry and labor in dealing with specific health and safety hazards in the workplace and perform relevant medical, safety and industrial hygiene research.

For today, we have representatives of four centers with us. Dr. Robert Spear, president of the Association of University Programs in Occupational Health and Safety, is director of the Northern California Center at the University of California at Berkeley. Dr. Jeffrey Lee, president-elect of the association, is interim director of the Rocky Mountain Center at the University of Utah. Dr. Morton Corn is director of the center at Johns Hopkins University. Dr. Steven Levine is co-director of the industrial hygiene program at the University of Michigan center.

Other center directors may wish to submit brief statements for the record. These will be included, without objection, and made available to the subcommittee members.

Our purpose today is to find out how well these individual centers are fulfilling their missions, to hear about special programs and to get some idea of future projects that they might have on the drawing boards and some projections.

So, we have quite an illustrious and well-known group with us, Mr. Hayes. I think the best thing to do is to get right into it. Do you have any statement you would like to make at this time?

Mr. HAYES. I have no statement, Mr. Chairman, thank you.

Mr. GAYDOS. Gentlemen, do you want to take your places? Proceed in a manner that best fits your purposes. You can summarize if you wish, or read your prepared statement. We can get together a little discussion here.

First I want to thank you profusely for your appearance here today. We don't have that much of an honor too often where we have such illustrious personnel with all the experience and dedication you have in your particular relative professions meet before the committee in such a group. I have talked enough already, it's your turn.

STATEMENT OF MORTON CORN, DIRECTOR, OCCUPATIONAL SAFETY AND HEALTH CENTER, SCHOOL OF HYGIENE AND PUBLIC HEALTH, THE JOHNS HOPKINS UNIVERSITY

Mr. CORN. Mr. Chairman, I am Morton Corn. It is my pleasure to be here with you.

I would like to work from my statement, reading in parts, adding some other comments, and leave the statement with you. It is not my intent here today to give you the facts and statistics that are summarized in annual reports of our ERC. I would like to give you a feel for what this center represents in this region and within the university setting that it exists, the Johns Hopkins University.

This university did not have a major program in occupational safety and health when the competition for these centers funded through NIOSH was made available in the late 1970's. There had been a few students who studied the subject area with faculty who were committed and received a degree, but there was not an organized program. Those educational programs left many vacancies in their education. Hopkins decided to develop this area. It went into the competition on the commitment to the area and, because of its previous accomplishments in medical and health education and its commitment to do this job, competed successfully.

The ERC is based in the School of Hygiene and Public Health, a graduate school research institute, with a ratio of 250 faculty to 700 students, about three to one. All of our students have first degrees. We pride ourselves on educating and training for leadership. Competition for admission is rigorous; the programs are rigorous.

I came from another university and have been very, very pleasantly surprised at the quality of the students that come to Johns Hopkins. I came in 1980, leaving another university, to be with colleagues who could focus together on these subject areas at an ERC. At my previous university, Pittsburgh, I was quite pleased to do this work, but I was alone. And this was a chance to bring together the disciplines that work in an ERC. So, I came here, and I mention in my testimony Dr. Billings came from previous careers at Michigan and Harvard. Dr. Emmett came from Cincinnati. The point is that ERC's have brought together a mass of people at 15 locations who, working together, can do far more than they can do working alone and scattered throughout the country.

I could elaborate on that further, and perhaps some of my colleagues will also make that point, that the critical mass, if you will, of allied talents is what is needed to attack both the training and the research in the very complex area of the interaction of the work environment and people.

We now have about 12 medical residents each year, 25 full-time students in hygiene and safety, and 12 nurses. In addition to these full-time students, a whole battery of courses has been developed which other students take. We have about 170 students taking a master of public health degree a year. They are all physicians, for the most part. They will become directors of health programs in State, Federal and local governments. Most of them now take an option of a health and safety course concerned with the environment. So, we have an overlay to a large number of health professionals while training the specialists.

These numbers may seem small, I indicate in my testimony, but when you remember that a physician is usually associated with a facility of a thousand or more and hygienists with the same kinds of numbers, you see that the impact of these numbers of people, despite their apparently small numbers, is very great. Twenty-five hygienists will impact on 25,000 or more. And similarly for 12 physicians, they will impact on 12,000 to probably 30,000, as a minimum, people at work.

We have also done a great deal in our continuing education and in our nursing, in particular, to train the trainers, to achieve this multiplying factor. If you can train the trainers, you can reach many more. And I think that philosophy runs through the ERCs.

We also have a seminar series at the university, supported through the ERC where we bring people in from all fields associated with safety and health; 30 to 300 attendees routinely show up at those seminars.

We have instituted a professional practice program whereby students and faculty work in the community. And here I mean the contiguous States as well as Maryland. It is our clinic. We call it our Environmental and Safety and Health Clinic. A physician has a clinic to see patients, and we do run an occupational health clinic for patients. Now we also have an environmental clinic to solve problems. We go into factories and workplaces.

I indicate that in this regard we have worked for private companies, IBM, Allied, General Electric; school systems, the University of Delaware, the Maryland school system; local government, Baltimore, the State of Maryland; and the EPA, the GSA, and the GAO. In fact, we have produced an asbestos management manual for the GAO that is now being used as the working document for GSA as well as GAO, and we have recently been asked to extend this document to the Library of Congress.

So, the ERC's are exerting their influence through applying their skills in the community, and it is also a training ground for students.

Our continuing education program is reaching thousands of professionals and nonprofessionals each year. Some of the courses we offer are toxicology, asbestos management, industrial hygiene, aspects of occupational medicine, occupational health nursing, and safety and health aspects of hazardous waste sites; there are others. We develop special courses for organizations. We have done that for companies, the Allied Co., the Dupont Co., the FMC Co. We have done that for State and Government agencies. They are hand-tailored courses not open to outside subscription, only for members of the organization.

We have developed such a course for the Construction and Allied Trades Union in training their trainers to deal with asbestos that their members work with.

Let me turn to financial matters. About 90 percent of our school funds are provided through outside sponsorship. That is, endowment income, gifts or tuition only account for 10 percent of our financing, which strikes many as remarkable since our tuition is over $10,000 a year. Yet, 90 percent does not come from those sources. It comes from research sponsorship.

We have been working diligently to obtain additional support for these professional education programs and have personally solicited grants from the Shell Co., Exxon, American Hospital Supply, Stauffer, Monsanto, and the Gulf Oil Co. I personally devote a very significant portion of my time to these solicitations. We would not receive them without the base funding from the Government.

An inevitable question is, What are we adding to this? What do you get from the Government? In my opinion, private sector moneys will never completely support this effort. It will always supplement it. It will always help, but it will never completely support it. And the Government commitment must be substantial and long term.

This is not a field where graduates earn high incomes after graduation. The majority of our graduates are staff professionals. They provide services to organizations, be they in government, unions, or the private sector. They are in comfortable but not extraordinarily lucrative livelihoods and will never contribute to support educational programs to the extent, say, that business graduates of business schools do.

I mention that because I am often asked, why don't your graduates endow chairs? Our school has two endowed chairs out of 250 positions. Public health is not a lucrative professional field.

I have described the characteristics of our——

Mr. Gaydos. May I interrupt you there, Doctor?

Mr. Corn. Yes.

Mr. Gaydos. What type of a professional, particularly with a medical background, would gravitate to the center down there? As you said, it is not a lucrative field.

Mr. Corn. Very idealistic and committed people go into this field. If they are interested in the material benefits of their profession, they can do better in other areas of effort. We get people who have a personal commitment to, for one reason or another in their background or upbringing, bringing these services to people at work who they believe need them.

Mr. Gaydos. It's about that simple, that basic?

Mr. Corn. Absolutely. I have never discussed this with my colleagues. I would be interested in their views on it.

Just as I think from my experience in the Federal Government, it is no accident that somebody works for OSHA or EPA and not for other branches of Government. They drift there or are gravitating there for reasons associated with their individual backgrounds that lead them to put their efforts to help other people in this specific area.

Mr. Gaydos. All right. Excuse me for interrupting.

Mr. Corn. We do not get people who want to practice internal medicine and go it alone and reap large financial rewards. I am impressed with the idealism of the people who come to study this subject.

Mr. Gaydos. Remember, you and I had some contact years back as far as the air pollution in and around the Pittsburgh area many years back. I am just wondering how and why the University of Pittsburgh let you slip through their fingers. You ended up down here at Johns Hopkins.

You left around 1980?

Mr. Corn. Yes; the beginning of 1980.

Mr. Gaydos. I am not going to ask you if you regret it.

Mr. Corn. Very, very mixed emotions, Mr. Chairman.

I might say that it was not any unhappiness with the Pittsburgh area or the University of Pittsburgh. In the words of the novel "The Godfather," Hopkins made both my wife and I academic offers that we could not refuse.

Mr. Gaydos. Even if you're offered the chancellorship of the University of Pittsburgh?

Mr. Corn. We're a dual-career marriage, and I won't go into any further elaboration. We sought two positions and Pittsburgh couldn't help us.

Mr. Gaydos. Thank you, but Pittsburgh's loss is surely Baltimore's gain.

Mr. Corn. Thank you, sir. I like to think that the job I am doing goes beyond Baltimore.

The commitment to continue this is at the institution. I wanted to give you a feel for this endeavor. It would continue. I don't wish to mislead the committee. If we lost Government funding, some level of effort would continue. I think we have institutionalized this subject at Johns Hopkins.

It would be very much reduced. Our impact would be less, but it wouldn't disappear. And I don't mean to raise those fears here. But our impact is proportional, I feel, to the extent of the government funding. My ability to supplement that funding is critically dependent on it being there.

I served on the committee of the Office of Technology Assessment which authored the recent Superfund implementation report. Mr. Hirshhorn was the staff officer. One of the major conclusions of that report is that training needs in hazardous waste are perhaps a prime need, maybe the major need, for the field to move forward. We simply do not have professionals to appropriately carry out the tasks outlined by OTA and assigned to EPA to implement. We need the day-to-day professionals, which in the areas of health and safety are the very professionals we are training.

Hazardous waste is another aspect of what we do. And I raise the point in my testimony that there is no reason that we shouldn't use this base we built in 8 to 9 years for these centers to assist with hazardous waste training of personnel, just superimpose it and build it on what we can do at the ERC's. Such discussions have been initiated and, hopefully, will reach some fruition.

So, the ERC is a multi-resource center. Hazardous waste is now a new national problem. It involves the people who work on the sites. It involves the communities and physicians, hygienists, nurses, safety people—the very people who can contain those hazards at hazardous waste sites. I think the ERC's can play a major role here.

Mr. GAYDOS. May I interrupt you there? Will they be trainers or professionals at the site? Will they put a series of instructions together for personnel who operate on these hazardous sites, or are they the individuals themselves as a graduate of your institute doing the actual physical work on the site? How does that work?

Mr. CORN. They oversee the work on the site.

Mr. GAYDOS. They oversee it.

Mr. CORN. They oversee. The people have to be watched by the physicians. They have to be selected. The same susceptibilities for jobs in the workplace exist at the hazardous waste site. The hygienist must watch the procedures, and the safety personnel must be sure that procedures are carried out properly. And there is also interaction with the community, which our people can do very well as explainers, if you will, of the degree of risk.

Mr. GAYDOS. Does that professional then originate instructions, explanations, rules, regulations, and things like that?

Mr. CORN. Exactly.

I think what we are seeing is, we have the hazard communication and the right to know in the workplace, long overdue and finally, marvelously being implemented. But that is beginning to extend to the communities. Communities are anxious to know what is going on. So, our people are in discussions with members of the community as well.

Mr. GAYDOS. What type of certification does he carry with him? Is it in the form of a degree, a formal degree, or is it a certification?

Mr. CORN. It is certification. The degree is usually the first qualification. Then we have the physicians board certified. The hygienists are certified. The safety professionals are certified. The nurses are certified. There is an overlay certification.

Mr. Gaydos. And the subject matter he covers can be used in another curriculum that might be set up where he would want to proceed and go in and get another degree in a related field?

Mr. Corn. It's not another degree. It is an extension of these talents to a subject area with certification.

I am doing a great deal of work in the hazardous——

Mr. Gaydos. What do you call him? What kind of name does he have? I am very serious.

Mr. Corn. They don't have names today. They are just filling in and trying to do the job.

I am involved in hazardous waste——

Mr. Gaydos. A hygienist?

Mr. Corn. Yes, hygienist, safety professional physician.

Mr. Gaydos. It might be a simple question, but when we had the legislation in front of this committee many years ago, we never had a descriptive terminology describing officially what an actuary was. We went through the whole legislation. I am talking about ERISA, the income retirement plan that we have in this country that protects both white collar and blue collar workers. A lot of people think that it doesn't take care of these things. Anyhow, I remember the difficulty we had with the term actuary. Who certifies? What is he? What kind of a certification does he carry? Who puts that together? Who recognizes it? You know, like self-ordained ministers a lot of times we have difficulty in the country, nobody wants to take credit for it or responsibility, one of the two. So, we had the same difficulty.

That is why I asked you the question. This man travelling around, this person, man or woman, that completes the curriculum, he is then a certified hygienist?

Mr. Corn. No, a graduate. I am a certified safety professional. That is a separate certification by the professional association. It had nothing to do with my degree, and there are additional requirements for that. Certified hygienists have that. Board-certified physicians have it. It is superimposed after the degree. It has a period of practice before you can even apply for it.

Mr. Gaydos. Does the association have any kind of a testing program later on, maybe a continuing educational program or even some type of a prerequisite testing?

Mr. Corn. To maintain your certification, each of the certifying bodies requires a certain number of hours of upgraded continuing education, yes. That is part of the certification procedure.

It is an effort to assure the public you are getting what you think you are getting. I am not saying certification is 100 percent effective, but it is better than not having certification.

The recent years have seen a relaxation of the implementation of the OSH Act, I believe, from vigorous enforcement. The pendulum has swung in this administration to what is termed volunteerism by some, and others less charitable, to benign neglect. What I want to address in this climate is why are we training health professionals and technical professionals if we are going through this period? Well, it has been a fascinating shift. The impact on organizations to reduce overhead has been extreme. They are reducing health professionals in organizations. There is no question about that, in general. At the same time, the services must be performed, so the consultants are supplying it. Consultants are called operating expenses by organizations. So, most of my graduates these days are going to consulting firms and to the military. Five years ago, 6 years ago, they were going to the organizations. But now the organizations, pressed for reducing overhead, are cutting some of these positions and buying the services.

So, the need for the professionals hasn't changed. We haven't any unemployed graduates. The need is great. They are just going to deliver the services in different ways. That is what is occurring out in the workplace today.

Personally, I believe people employed by their organizations can do a better job than purchased consultant services, who have no commitment to really learn the details of the workplace they are delivering services to. Nonetheless, I believe we are in that operating mode today. And it will change back. The pendulum will swing the other way.

I wanted to address that. The need for these people is. We have many demands for the graduates. Where they go in the economy shifts.

Also, the demand is being stimulated by the hazard communication, the new right-to-know laws. That is a very, very important happening. I equate it with the principal occurrence since passage of the act. But the so-called right to know or hazard communication has gone through the workplace like a tidal wave. It is long overdue, and it is being implemented. That creates the desire to get detailed factual understanding of these hazards, which requires the professionals.

We submit voluminous reports each year to NIOSH. As I wrote this, I indicate in my testimony, the 1984 report faced me. It is 2½-inches thick. I dread doing them each year, but they do provide a historical resource on the details of everything we do. I would refer you to that. Each center submits them. In my opinion, the ER'Cs will be viewed historically as perhaps NIOSH's major contribution to health and safety during its years of existence. That sounds like an extreme statement, but I do believe ERC's have had a greater impact than any other activity of NIOSH's.

I have attempted to give you a little flavor of our ERC and the reports can give you a more rounded picture. I have not dwelled on the research. We do enormous amounts of research. That is a whole new and different story and could be the basis for other hearings such as this. But we are deeply involved in research. I focus here on the training aspects of our ERC's. Without those professionals on board, the research couldn't be done; and they, of course, have gotten involved in research.

Thank you very much for your patience. I would be pleased to answer any other questions.

[The prepared statement of Morton Corn follows:]

PREPARED STATEMENT OF MORTON CORN, PH.D., CSP, DIRECTOR, OCCUPATIONAL SAFETY AND HEALTH CENTER, SCHOOL OF HYGIENE AND PUBLIC HEALTH, THE JOHNS HOPKINS UNIVERSITY

Mr. Chairman and members of the committee; it is my pleasure and privilege to be asked to appear before you today to examine the role that The Johns Hopkins University Educational Resource Center in Occupational Safety and Health has played as a regional resource in education, training and research. My testimony will not extensively dwell on the statistics of individual class numbers and graduates, although I will mention some critical figures. Rather, it will focus on the philosophy and implementation of the Center and provide details of how we have assisted organizations and individuals struggling to improve the conditions under which men and women earn their livelihood in often hazardous workplaces in this country.

The Johns Hopkins University did not have a major program in Occupational Safety and Health when the competition for educational resource centers, funded through the National Institute of Occupational Safety and Health, was announced in the late 1970's. A few students had studied occupational health in selected courses under the direction of a few faculty members with ongoing interest in this subject area. Degrees were piggybacked on programs primarily focused in other specialty areas of medicine, nursing and environmental health engineering. Hopkins competed for an ERC on the basis of its commitment to the subject areas and its promise to build an educational resource center. Of course, the University's previous track record for excellence in graduate education in the medical and health sciences also influenced the decision to award the ERC.

The Educational Resource Center is based in the School of Hygiene and Public Health, a graduate institution with approximately 250 full-time faculty and 700 graduate students. It is a research and training center; Hopkins has long held the philosophy that it trains for leadership. Admission standards are high, the workload extensive, and the program rigorous. Three-fourths of the faculty now involved in the professional educational degree programs in occupational medicine, occupational health nursing and industrial hygiene and safety sciences have been recruited since the first year of Center operations, namely 1977. I joined the Hopkins faculty on January 1, 1980 coming from the University of Pittsburgh. Dr. Edward Emmett, who directs the program in occupational medicine came from the University of Cincinnati Kettering Laboratories. Dr. Charles E. Billings, joined the faculty after career assignments as an educator at the University of Michigan and Harvard University. I could continue in this vein, indicating that the opportunity for focused efforts by professionals, who need the complimentary skills of their colleagues in allied fields, attracted many to the Hopkins Center. Many of us were alone, or nearly alone, in this subject area at our former universities; we lacked the so called "critical mass" of allied talents which ERC's provide.

The programs at our ERC now have approximately 12 medical residents each year, 25 full-time students in industrial hygeine and safety sciences, and 12 nursing professionals. In addition to these full-time students, the specific courses developed in occupational safety and health attract students from allied fields. The overlay of occupational safety and health which these allied students will obtain can only benefit working men and women because these individuals will have major program responsibility in the health sciences areas after graduation. The numbers I mention may appear somewhat small to those not familiar with the field of Occupational Safety and Health; however, the full-time employment of one physician is generally not associated with plants fewer than 700 to a 1000 employees; a hygienist is usually associated with several thousands of workers as a minimum number. Occupational health nurses are employed in plants of all sizes. Thus, the impact on the workforce and working conditions of these numbers of highly qualified graduates is substantial. Indeed, they represent the largest numbers of health professionals in this field. However, at Hopkins our nursing program is geared primarily to training doctorate occupational health nurses to staff educational institutions throughout the country. There is a major shortage of potential faculty members to staff occupational health nursing programs in this particular field we subscribe to the philosophy of "train the trainers".

Development of the professional programs was the initial focus of our Educational Resource Center. However, around them we have built seminars with distinguished lecturers open to all other members of the campus to lay the groundwork in the fundamentals of this field. These seminars have drawn from 30 to 300 attendees, depending on the particular speaker.

Also we have instituted a professional practice program whereby students and faculty work in the community (and by the community I mean the contiguous states as well as the local Maryland area) to obtain field experience and practice in this field, as well as to provide services to others. In this regard we have accepted contractual arrangements with private sector companies (IBM, Allied Corporation, General Electric), school systems (university of Delaware, Hagerstown, MD. school system), local government (Baltimore City Health Department), State of Maryland, Federal government (EPA, GSA, GAO) and unions (construction and allied trades). In the latter regard, we helped to train the trainers in the union program designed to provide health and safety education to workers employed in asbestos jobs.

Our Continuing Education program, developed through the Educational Resource Center is reaching thousands of professionals and non-professionals each year with courses ranging in duration from one day to five days. We offer courses in Toxicology, Asbestos Management, Industrial Hygiene, Aspects of Occupational Medicine, Occupational Health Nursing, and Safety and Health aspect of Hazardous Waste Sites, to mention only a few of the subject areas. In addition, we provide specialized hand tailored courses for specific organizations and have provided such courses for employees of the State of Maryland, for the Environmental Protection Agency and for individual corporations (Allied, Dupont, FMC). We do not provide professional practice and continuing educational services free of charge and have made a major effort to make these activities self-supporting. I am happy to report that they are indeed at that point or close to that point.

With regard to financial matters, the educational program for professionals and seminars could not possibly proceed without funding through the NIOSH grant. Approximately 90% of the funds of our school are provided through outside sponsorship of research and training; 10% derives from endowment income, gifts or tuition, although our tuition is in the minds of many extraordinarily high (in excess of $10,000 per year). We have been working diligently to obtain additional support for the professional education programs. In this regard we have personally solicited student scholarships and unrestricted gifts from organizations such as the Shell Company, EXXON, American Hospital Supply Company, Stauffer Chemical Company, Monsanto Company and the Gulf Oil Company. I personally devote a substantial number of hours to both written and personal solicitations for such funds, and will continue to do so. We could not possibly achieve this supplemention of funds without the base funding provided by NIOSH. It is my personal opinion that private sector monies will never completely support the type of education that we are discussing here. Although we will continue to work diligently to obtain funds from the private sector, it is clear to me that the government commitment must be substantial and long-term. This not a field where graduates earn high incomes after graduation. The majority of our graduates are staff professionals providing services to organizations, be they in government, unions or the private sector. They are in comfortable, but not extraordinary lucrative liveihoods and will never contribute to support educational programs to the extent as those entering into careers in business.

I have described the characteristics of our particular educational resource center. The Center is now an essential part of the graduate environment at The Johns Hopkins University and could be sustained, albeit at a very much reduced level of activity, without NIOSH support. The commitment to do this is at the institution. However, our impact is very much in proportion to government funding. We are a superb resource to extend our influence to other areas of need. I served on the Committee of the Office of Technology Assessment which offered the recent Superfund implementation Report. In this report, training needs were depicted as great in the health and safety aspects of dealing with hazardous waste sites in the United States. The latter is a problem that will consume huge resources in the coming decades. We simply do not have professionals to appropriately carry out the tasks outlined by OTA and assigned to EPA to implement. We need professionals for the ongoing day-to-day problem solving and for the research that will improve the assessment and disposal methodologies that are now so costly and uncertain with regard to their technical effectiveness. The Educational Resource centers are a perfect base on which to build the training of professionals for this area of need. It has taken eight to nine years to bring the ERC's to where they now are; ERC faculty and staff are ready and willing to serve as a resource for health and safety needs of the nation, regardless of the particular classification of the problem by government in its efforts to address the manifold problems of the nation. To us health and safety cuts across problem lines, although the funding mechanisms are narrow and specific because authorization of funds must be treated that way.

During recent years we have seen a relaxation of implementation of the Occupational Safety and Health Act of 1970. From vigorous enforcement and implementation the pendulum has swung to what I term volunteerism or others refer to as benign neglect. However, the training of health professionals and technical professionals in this field goes on and they continue to be utilized in areas where activity is intense; at the present time this is primarily in the consultation field. As efforts within organizations decrease, consultants are utilized because organizations are interested in reducing overhead, which means reduced head count. Although but the work must still be done, organizations are calling on consultants because they represent operating expenses in bookkeeping, rather than overhead. The primary market for our graduates in recent years has been the military, which is expanding its health and safety efforts and consulting, which is filling the needs of organizations that have cut back professional staff numbers. Therefore, the vicissitudes of our national schizophrenia with regard to enforcement of the Occupational safety and Health act does not reduce the need for trained professionals in the field; the need remains acute. In addition, it does not reduce the need for a higher level of understanding on the part of all those involved in this work, primarily the employee. The new Right-To-Know laws and the OSHA Hazard Communication Rule demand professional attention for implementation, or one may do more damage than good in transmitting incorrect information. Thus, despite reduction of activity of ERCs' during the last four years, those we have graduated have not found difficulty in obtaining employment. I dwell on this point because I have heard some say why are the ERCs' graduating people when activity is at such a low level of demand? Although the areas of employment shift as the posture of the government alters, demand is reduced but significant activity in this country goes on.

The ERC's submit voluminous reports of progress to NIOSH each year. The 1984 report from our institution faces me as I write this testimony; it is about 2½ inches thick. I have written such a report for each of the years of our activities. They are a chore, but they serve as a remarkable document for delving into the details of activities of the ERC. They form a historical record of the incredible progress made in these eight years. In my opinion the educational resource centers will be viewed historically as perhaps the major contribution of NIOSH during its entire history since the passage of the Occupational Safety and Health Act. I have attempted in these remarks to give you a little flavor of the JHU Educational Resource Center. The reports we have filed with NIOSH will provide abundant statistical and descriptive information to further round out your picture of this remarkable effort. I have here stressed our approaches to teaching and have not dwelled on recent shifts to increased research by ERC faculty and staff. This is subject for further review; a promising and exciting story of centers initially developed to train practitioners, now contributing to investigator training and adding new knowledge to our understanding of occupational safety and health. Thank you for your patience. I will be pleased to answer questions.

Mr. GAYDOS. I just have one question and then I will call Mr. Hayes.

Do I understand that the program was put into being upon your transfer from the University of Pittsburgh to Johns Hopkins?

Mr. CORN. No. It preceded me by 3 years. We competed at Pittsburgh and did not receive the award.

Mr. GAYDOS. I see.

Mr. CORN. There is no question that I would have welcomed it at Pittsburgh. But in the absence of that and with other things happening in my life, the Hopkins opportunity became very attractive.

Mr. GAYDOS. Mr. Hayes, do you have any questions for Mr. Corn?

Mr. HAYES. One broadside question, and there probably isn't an answer to it. Is there any academic training that one can get that will protect us against any further Three Mile Islands?

Mr. CORN. If I could with one stroke institute an education ingredient in this country that would help us in these matters, I would put a course in the business schools of America. And borrowing a phrase from a colleague of mine, I would call it Toxicology for Tycoons. I think our business leaders do no learn anything in graduate business school about their responsibilities to the community and the society in occupational safety and health and environment. They are, in general, good and well-meaning people. They don't even know our vocabulary until something goes wrong. They learn about their fiscal financial matters. They learn about business organization and interpersonnel, strategic and long-range planning. But they don't discuss for 1 hour in that business school education that produces the majority of our business and organizational leaders, the subjects of environment and health and safety.

When I encounter them, sometimes after a tragedy, we can't even speak the language until I teach them the vocabulary. And that is an omission that we are suffering from.

Mr. Hayes. Just last week—this could be the beginning—I saw where one factory owner was convicted of murder in Chicago.

Mr. Corn. In Chicago, at the Film Recovery, firm. I concur with the judgment. I watched that case closely. I think that will draw the attention of people that should pay attention to this.

Another anecdote: I am very pleased that 3 weeks ago my son graduated engineering school in chemical engineering. And he did not have 1 hour in a good engineering school, 4-years of instruction, on his health and safety obligations to the people under his supervision or 1 hour on environmental waste treatment, in a 4-year chemical education. He was told that, well, when you get to your employer, you deal with the specifics of that in your particular environment.

So, we have an omission in the engineering schools in this area that some of us have been working with NIOSH to correct.

We have the professional expertise to advise and deliver services. We have to make those who are the recipients of our services and organizations more receptive and understanding of what we do. We are training the professionals to deliver the services. Now we have to lay the groundwork for getting the attention of those who need the services. Many of them are not aware they need it until there has been a tragedy, even today, 15 years after the act.

Mr. Hayes. Thank you.

Mr. Gaydos. I have just a comment, following that discussion. It's the same, as I mentioned before, on the actuaries, it's unfortunate that it is so difficult to get something. We passed that legislation. I was part of formulating it. We had late-night arguments. I think you remember some of the details. We just couldn't get a disinterested Congress as a group to understand the implications. Here we have an atomic energy plant, and actually no regulation for a certified person to be the person that is responsible for the action. Technically, it's true, I think it is, there is no person there that can say, hey, you have to have a license, and you have an engineering degree, you have other personnel there, until the advent of the centers such as we are speaking of here. Nobody carried a certificate around that you can point to him and say, he's had a course and he's prepared, and it's reasonable to rely upon him. It is really a tragedy.

Mr. Corn. Nobody was accountable other than in a general way. I think this decision Mr. Hayes referred to is a marvelous change of philosophy. I don't know if it will be sustained, there is talk that it won't. But just that it happened, it takes the faceless nature off organizations and holds senior people accountable. And they are accountable.

When I went to work as a college student in a logging camp, I assumed people had thought about the health and safety. I worked at what is called a choker setter. I watched them carrying people away from the logging camp. It dawned on me when I was 18 years old, they haven't thought about these things; I had better watch out here, this is a dangerous place.

But when I went to work, my attitude was, if they hired me, they must have thought about taking care of me. And that was my first experience. Nobody had thought about taking care of me on that site. I later learned lumbering and logging was one of the highest traumatic injury occupations in this country.

So, this type of decision in Chicago sends a message out to executives; you have a responsibility. You may be five layers removed, but you better ask the right questions and get your agents, the supervisory chain of command, to think about their responsibilities for taking care of those people on the job. And it's not some nebulous senior level that will pay fines. We are going to hold you accountable individually.

I think that is the proper message. I am in total agreement with that decision.

Mr. **Gaydos**. You wonder how the country operated for 200 years with no OSHA. OSHA is only 15 years old. I remember the tumultuous time we had on the floor of the House. Everybody wanted to rip it apart, destroy it, emasculate it, just get rid of it.

Mr. **Corn**. Mr. Chairman, they still do.

Mr. **Gaydos**. Yes, well, we don't have 250 bills introduced like we had around 4 or 5 years ago. Every time you turned around, there was another bill introduced. If you put them all together, you wouldn't have any OSHA. But now we are in great shape.

Mr. **Corn**. Is Stop OSHA still in existence? When I was here in Washington, there was an organization within the Congress, Stop OSHA.

Mr. **Gaydos**. It has disappeared.

Mr. **Corn**. Wonderful.

Mr. **Gaydos**. I guess we have taken enough of your time. But before we go any further, all the submitted statements, without objection, Mr. Hayes, will be made part of the record.

Mr. **Hayes**. I have no objection.

Mr. **Gaydos**. I am looking at them. They are excellent statements. I just hope my colleagues and anybody else in this great country of ours will take a little bit of time to read this record, study it, and maybe it will give them some direction.

Mr. Lee, welcome to the committee.

STATEMENT OF JEFFREY S. LEE, INTERIM DIRECTOR, ROCKY MOUNTAIN CENTER FOR OCCUPATIONAL AND ENVIRONMENTAL HEALTH, UNIVERSITY OF UTAH, SALT LAKE CITY, UT

Mr. **Lee**. Thank you. It is a pleasure to be here.

I am happy to report I am from the University of Utah, where we still keep our heads above the rising water of the Great Salt Lake.

Our four centers were chosen in part because of the diversity and differences we have, which I think adds to the strengths of the ERC program. So, I think in my prepared testimony you will see some differences between the Johns Hopkins University as well as the other universities represented here as well as some striking similarities.

Relative to the other occupational health and safety training programs in the country, including those represented here today, the Rocky Mountain Center for Occupational and Environmental Health at the University of Utah is still an infant. Indeed, we were conceived and born as a result of the NIOSH Educational Resource Center Grant Program in 1978 and would probably die at an early age without continued Federal support. That is not to say we don't have hopes, even with a fair amount of confidence, that one day in our adolescence we will be able to survive, independent of Federal assistance; but that day, unfortunately, is a lot further off than any of us had realized when we first began.

We are proud of what we have been able to accomplish in a rather short period of time. I would like to tell you a bit more about what we have developed and give you some examples of our efforts that have significantly impacted on the health and safety of the American worker.

The Rocky Mountain Center involves a collaborative effort of three different schools: the School of Medicine, the College of Engineering, and the College of Nursing. As you know, a fundamental premise of the ERC Program has been that the field of occupational health requires a multidisciplinary approach and that graduate training should bring together the disciplines of occupational medicine, industrial hygiene, occupational health nursing, and occupational safety and ergonomics. In addition, other specialties, most notably epidemiology, biostatistics and toxicology, play important contributing roles. Achieving the coordination and integration of these training programs at a graduate level in a large university is often easier said than done.

It has been personally rewarding to see the interdisciplinary concept grow and develop at the Utah ERC. A major positive outcome has been the multiplicative effect that Federal resources have had. By providing limited support to multiple collaborative programs within the university, and by stressing multidisciplinary training, we have found that each of the programs is much stronger than it would be if functioning independently.

Another positive spin-off of the ERC Program has been the establishment of the faculty resources to not only provide occupational safety and health training, but also to have the capability to conduct vitally needed occupational safety and health research. Realistically, in a university setting, it is often difficult, as well as undesirable, to separate where training stops and where research begins. Our graduate students and residents obtain master of science degrees, which requires a research project, resulting in a scientific thesis and paper of publishable quality. Faculty must establish themselves as independent researchers as well as good teachers.

The ERC grant allows us to attract and retain these faculty by supporting a part of their salary reflecting the percentage of time they are engaged in training activities. The remainder of their time can then be devoted to research supported by other sources. The major point is that without these funds, we would be unable to provide a basic financial foundation for these faculty and hence would lose not only the training function but the research capabilities as well.

On a national scope, we have been actively working with NIOSH and our supporters to broaden the scope of the ERC Program to recognize the importance of the research component. As an active participant in this process over the past year, I can testify to the excellent collaboration that has evolved between the ERC's, NIOSH and the Centers for Disease Control in achieving a consensus. I am confident that as a result, in the long term, the contributions that the ERC Program will make toward identifying and reducing occupational disease and injury will be even greater.

Utah's largest employer is Hill Air Force Base, a large installation with over 20,000 personnel, including about 14,000 civilian employees. The principal mission of the base is the repair, overhaul and maintenance of military aircraft and components. The range of related industrial operations reflects a microcosm of American industry. Beginning in the 1970's, the civilian employees at the base became concerned that their health was being jeopardized due to exposure to chemicals used on the job. They were specifically concerned by what appeared to be an excessive incidence of cancer among base employees. Worker compensation claims and lawsuits were filed and hearings were held by the U.S. House of Representatives in 1979 and by the U.S. Senate in 1981. Senator Orrin Hatch opened the latter hearing by stating:

> If there is a villain in this controversy, it is ignorance; ignorance of the proper methods relating to the protection of the employee from harmful chemical exposures; ignorance of the scientific knowledge related to the effects of worker exposure to chemical substances; and ignorance of the now accepted fact that occupational causes of disease and illness often go undetected and unrecognized for a long period of time.

NIOSH conducted a health hazard evaluation at the base in 1978 concluding additional studies were needed. A major study was ultimately begun in 1982, funded by the Air Force through the National Cancer Institute with the Rocky Mountain Center conducting a major portion of this research. At issue is not just the working conditions at Hill Air Force Base but also the suitability of existing occupational standards for specific chemicals. In addition to cancer, other possible health effects may be occurring at the base. The Rocky Mountain Center is currently also developing research grants to investigate reproductive and neurological effects from these chemical exposures.

I dwell on this example of our activities to illustrate that it is doubtful these specific studies would be possible without the resources of the Rocky Mountain Center. This type of study is undoubtedly frequently repeated at the other centers. Studies like Hill Air Force Base also provide the opportunity to merge our training and research functions. We provide Hill Air Force Base with students who gain practical experience there as part of their training.

An additional strength of the ERC's is the continuing education program that is a component of each of the centers. At Utah we have trained approximately 7,700 safety and health professionals in the 6 years that we have had a continuing education program. The efforts bring the latest knowledge to the practicing professional. We do charge a tuition fee for these courses to supplement our ERC funding. However, we also provide scholarships for individuals who are unable to pay the tuition. We have given over 100 scholarships over the past 5 years. The current employment of these individuals has been extremely diverse, ranging from the small business employer to government.

Lee Huber works for the State of North Dakota and was given a scholarship to our comprehensive industrial hygiene course. He is solely responsible for North Dakota's OSHA Consulting Program and has recently been given responsibilities for hazardous waste. He stated that decisions he is responsible for affect approximately 700,000 people in North Dakota. Mr. Huber has no other industrial hygienist available with whom he can consult; in fact, there are currently only a few industrial hygienists in the entire State.

Donald Wodek is the administrator of health and safety for the Cleveland-Cliffs Co. He was being transferred to a position where he was responsible for the health and safety of over 4,000 employees and needed additional training in occupational health.

These two individuals, who vitally needed the training that only the ERC's are currently providing, received scholarships to our continuing education courses. Their work significantly impacts on the health and safety of the American worker.

The Rocky Mountain Center runs an occupational medicine clinic. We are the only such clinic in the State of Utah and, in addition, see patients from throughout the intermountain region. Our physicians on faculty and the few graduates of our program who have remained in the State are the only trained occupational medicine physicians in our area. Our clinic also reflects the interdisciplinary approach to occupational health: industrial hygienists and occupational health nurses, as well as occupational medicine residents, work together to solve the mysteries of occupational disease. The Poison Control Center refers occupational poisoning cases to us to handle, and both our industrial hygiene students and our occupational medicine residents handle inquiries under faculty supervision.

There are many diseases which we have yet to associate with exposure to toxic substances in the workplace. We recently diagnosed a case of chronic organic brain damage in a worker which was related to long-term, low-level occupational exposure to solvents at exposure levels below current occupational health standards. Effects included reduced intellectual skills and memory loss. We determined that this worker was disabled and could not perform his job, a determination which required considerable occupational medicine expertise. The neuro-behavioral effects caused by organic solvents have just recently been discovered, and safe levels to protect against these effects are not yet known.

We currently have 18 industrial hygiene students in our program, five physicians in residency programs, and five safety engineers. Our nursing program will begin accepting students again this fall and has temporarily been on hold since our nursing corps director has been on sabbatical obtaining her Ph.D. degree. The majority of our students receive financial support through the ERC grant. I am personally convinced that, even if we could maintain a training program if Federal funds were withdrawn, our ability to attract graduate students and residents would be severely impaired.

The Rocky Mountain Center at the University of Utah is located administratively within the School of Medicine. Only 15 percent of the School of Medicine's budget comes from State appropriations. Approximately 37 percent comes from Federal research grants and contracts, and approximately 29 percent comes from patient care. We maintain a teaching hospital that is struggling to maintain economic viability. It is important to note the difference between preventive medicine programs and other medical care programs within this milieu. The goal of preventive medicine is to prevent disease from occurring. If we see patients with disease, in a sense we have already failed. Unlike other clinical specialties in occupational health, our patients are the working population whom we serve. Our job is to keep them well. And who should pay for this reduction of elimination of disease and injury? The worker who now lives a safe and healthy life, the company that conscientiously controls their occupational health problems? In my opinion, the Government should appropriately bear this cost. The benefits accrue to the entire population.

I would like to conclude by expressing a personal opinion about the impact of occupational health and safety training on the rising cost of medical care in this country. No one really knows for sure how much disease is caused by the contribution of the working environment. It is a figure that is difficult, if not impossible, to obtain. Most experts agree that the figure is substantial.

Undoubtedly, those diseases that are recognized by the physician as occupational in origin represent only a small fraction of the actual total. Physicians untrained in the practice of occupational medicine rarely consider the source of the disease. They are generally only concerned with treating their patients and in making them well. The origin of the illness is often unimportant to them and thus is not identified as being occupation related.

The problem is further compounded by the fact that much occupational disease, particularly occupational cancer, has a long latency period, often decades, from the time of the initiating exposure to disease onset. Thus, patients themselves often do not make an association between their illness and their work exposures.

One could hypothesize that much of the disease that is currently being paid for through our socially supported medical care systems is occupational disease and that the percentage is increasing since persons are less likely to die of an acute or infectious disease and more likely to die of chronic disease such as cancer and heart disease. Control of occupational illness thus will undoubtedly help reduce the rising cost of medical care.

We should all keep in mind that occupational disease and injury is preventable. Workplace exposures to chemical and physical hazards can be controlled to safe levels, and occupational injury can be dramatically reduced with relatively easy and inexpensive controls.

What is lacking is trained professionals to do the job. The need for these individuals will always be much greater than the demand. The small employer simply does not recognize that a problem exists in his plant. However, it has been interesting to me to note that the more industrial hygienists, occupational medicine physicians, occupational health nurses, and safety professionals that we train, the greater the demand for additional graduates. I explain this in part by the fact that these graduates go to work for companies who did not initially recognize the magnitude of their problem until they hire a few trained individuals who then begin to scratch the surface and quickly recognize and justify the need for further help.

In Utah the ERC grant has enabled us to build a highly respected training and research program that impacts on students not only directly enrolled in our training programs but also medical students, engineering students, and business students. We have a long way to go, but the journey has been rewarding. Our efforts to reduce occupational disease and injury have been significant.

We must continue to support the ERC Program. The return far outweighs the investment.

Thank you.

[The prepared statement of Jeffrey Lee follows:]

Prepared Statement of Jeffrey S. Lee, Ph.D., Interim Director, Rocky Mountain Center for Occupational and Environmental Health, University of Utah

Chairman Gaydos and members of the committee, I appreciate the opportunity to testify before you today on the activities of the Educational Resource Centers (ERCs) funded through the National Institute for Occupational Safety and Health (NIOSH), and in particular, our activities at the University of Utah.

Relative to the other occupational health and safety training programs in the country, including those here today, the Rocky Mountain Center for Occupational and Environmental Health at the University of Utah is still an infant. Indeed, we were conceived and born as a result of the NIOSH Educational Resource Center (ERC) Grant Program in 1978 and would probably die at an early age without continued federal support. That is not to say we don't have hopes, even with a fair amount of confidence, that one day in our adolescence, we will be able to survive, independent of federal assistance, but that day is, unfortunately, a lot further off than any of us had realized when we first began.

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We currently have 18 industrial hygiene students in our program; five physicians in residency programs; and five safety engineers. Our nursing program will begin accepting students again this fall and has temporarily been on hold since our nursing care director has been on sabbatical obtaining her Ph.D. degree. The majority of our students receive financial support through the ERC grant. I am personally convinced that even if we could maintain a training program if fedeal funds were withdrawn, our ability to attract graduate students and residents would essentially be severely impaired.

The Rocky Mountain Center at the University of Utah is located administratively within the School of Medicine. Only 15% of the School of Medicine's budget comes from state appropriations. Approximately 37% comes from federal research grants and contracts, and approximately 29% comes from patient care. We maintain a teaching hospital that is struggling to maintain economic viability. It is important to note the difference between preventive medicine programs and other medical care programs within this milieu. The goal of Preventive Medicine is to prevent disease from occurring. If we see patients with disease, in a sense we have already failed. Unlike other clinical specialties in occupational health, our "patients" are the working population whom we serve—our job is to keep them well. And who should pay for this reduction or elimination of occupational disease and injury? The worker who now lives a safe and healthy life? The company that conscientiously controls their occupational health problems? In my opinion, the government should appropriately bear this cost—the benefits accrue to the entire population.

I would like to conclude by expressing a personal opinion about the impact of occupational health and safety training on the rising costs of medical care in this country. No one really knows for sure how much disease is caused by the contribution of the working environment. It is a figure that is difficult, if not impossible to obtain. Most experts agree that the figure is substantial. Undoubtedly these diseases that are recognized by the physician as occupational in origin, represent only a small fraction of the actual total. Physicians, untrained in the practice of occupational medicine, rarely consider the source of the disease, they are generally only concerned with treating their patients and in making them well. The origin of the illness is often unimportant to them and thus is not identified as being occupationally related. The problem is further compounded by the fact that much occupational disease, particularly occupational cancer, has a long latency period, often decades, from the time of the initiating exposure onset. Thus, patients themselves also often do not make an association between their illness and their work exposures. One could hypothesize that much of the disease that is being paid for through our socially supported medical care systems is occupational disease, and that the percentage is increasing since persons are less likely to die of acute or infectious disease and more likely to die from chronic disease such as cancer and heart disease. Control of occupational illness thus will undoubtedly help reduce the rising costs of medical care. We should all keep in mind that occupational disease and injury is preventable. Workplace exposures to chemical and physical agents can be controlled to safe levels and occupational injury can be dramatically reduced with relatively easy and inexpensive controls. What is laking is trained professionals on the job. The need for these individuals will always be much larger than the demand. The small employer simply does not recognize that a problem exists in his plant. It has been interesting to me to note, the more industrial hygienists, occupational medicine physicians, occupational health nurses and safety professionals that we train, the greater the demand for additional graduates. I exlain this in part, by the fact that these graduates go to work for companies who do not initially recognize the magnitude of their problem until they hire a few trained individuals who then begin to scratch the surface and quickly recognize and justify the need for further help.

In Utah, the ERC grant has enabled us to build a highly respected training and research program that impacts on students not only directly enrolled in our training program, but also medical students, engineering students and business students. We have a long way to go, but the journey has been rewarding and our efforts to reduce occupational disease and injury have been significant. We must continue to support the ERC Program, the return far outweighs the investment.

Thank you.

Mr. Gaydos. Director Lee, part of your prepared statement is so apropos to what we are doing here. We have a bill I have introduced, and I think we have some co-sponsors from committee members, and I think we are going to go into full hearings probably in September and October and, hopefully, have it ready for consideration the first part of the year. That bill, for want of a better explanation, provides for advance notification to employees who work in hazardous or high-risk activities.

I notice you have made the connection in your remarks about the cost of our medical problems in the country and also hazardous solvent materials, things of that nature. So, that is what stimulated that bill, I want you to know. We may be calling you back, maybe in a more detailed analysis of what we are trying to do with that legislation. I hope you would be available, if you could be, we would maybe like to have you back.

Mr. Lee. I will be glad to be available.

Mr. Gaydos. In fact, we are going to send you a copy of it. You may have some suggestions as to what we have left out, if anything, how we can improve it. If you do, back it up with some good scientific appraisals and facts and things like that, which I am sure you do.

Mr. Lee. I will do the best I can.

Mr. Gaydos. We are very interested.

Mr. Gaydos. Mr. Hayes?

Mr. Hayes. I just wanted to say that the statement, I think, is something that needs careful study and observation, which I shall give it. I was just wondering if the Senator, which you alluded to in your statement, shares your views in terms of need for Federal financing and funding to continue and expand the program?

Mr. Lee. I think he does. I think he does.

Mr. Gaydos. You know, we had a lot of notoriety about the solvent called DMSO.

[Discussion off the record.]

Mr. Gaydos. Let's go on to the next professional here. Mr. Levine.

Do you have any questions, Mr. Hayes?

Mr. Hayes. I have no questions. I have to go to another hearing.

Mr. Gaydos. Thank you for coming. We will make sure the record is clear and complete so that we will have the benefit of these individuals' professional opinions.

STATEMENT OF STEVEN LEVINE, CODIRECTOR, INDUSTRIAL HYGIENE PROGRAM, THE UNIVERSITY OF MICHIGAN

Mr. **Levine**. Thank you for inviting me to speak here. Today I will speak on the overall academic program structure of the University of Michigan Educational Resource Center as well as on three specific projects that address questions of national need at the University of Michigan's program.

The three projects that I will talk about are, number one, hazardous waste, which illustrates the role of the ERC's and the solution of the number one environmental concern in the United States. The second project I will talk about is on automobile production, which illustrates the role of the ERC's in the rebuilding of a major traditional industry. The third is on semiconductor manufacturing, which illustrates the role of the ERC's in the high technology industries of the future.

The program structure at the University of Michigan ERC is grounded in our experience that shows that the best system is an interdisciplinary system, a system that brings engineers and scientists and medical doctors together to do their research and to train students. The programs that are part of the ERC are occupational medicine, industrial hygiene, occupational safety engineering, continuing education, and the very important part of the program, the use of the industrial site resources in the area.

In occupational medicine, the basic concept of the program is that these problems can best be solved through prevention. The program stresses the diagnosis, surveillance, and prevention of occupational diseases as well as their specific therapy, where available.

One of the interesting components of the program is what is called an on-job, on-campus program, where M.D.'s can maintain their professional practices. They can be internal medicine specialists or any other specialty, and they can come to campus 3 days each month for a 2-year period to get specific training in occupational medicine.

The industrial hygiene program has many specializations. These specializations include chemical hazards, ergonomics, general industrial hygiene, and ventilation engineering. This is also an interdisciplinary program. It has strong interaction with the civil and environmental engineering department for the hazardous waste projects and with industrial and operations engineering through the Center for Ergonomics.

The occupational medicine and industrial hygiene programs are part of what is called the department of environmental and industrial health. This addresses a question you asked earlier. The department is strong, laboratory based, and interdisciplinary. Among the programs that are included in the department is radiological health. Some of our students study radiological health and industrial hygiene. So, that addresses at least in part the question of safety at nuclear power plants.

Students also can study toxicology, environmental health, environmental chemistry, water quality, and environmental law and policy. Faculty include medical doctors, chemists, biologists, biochemists, toxicologists, physicists, lawyers, and engineers.

The third component, occupational safety engineering, has several areas of specialization, which include ergonomics, safety engineering, industrial health, statistics, information processing and management. This program, which annually offers instruction in ergonomics to about 250 undergraduate and graduate students, has been recognized as a unique national center.

The continuing education program covers all of the areas I have just mentioned. It covers hazardous waste. It covers ergonomics. It covers lower back pain, occupational medicine. And it has one interesting program in it which is called the management briefing seminar. This brings all of the activities of the continuing ed program together and aims it specifically at middle managers in industry who are not interested in the very highly detailed presentations but the more educational presentation so that they can go back to their companies and use a more educated view of their responsibilities, much as Dr. Corn mentioned before.

At Michigan we have very strong ties to industry, labor and governmental groups. We have the center advisory board with members of industry and labor and government in the area participating and making sure that we address their problems.

A high concentration of industries is located near Ann Arbor, MI, including such industries as Dow Chemical Co. many automobile production facilities, Upjohn Pharmaceuticals, furniture, ink, automotive parts, rubber and high technology companies. This allows close interaction with these facilities for the purposes of research, training and continuing education.

Although we have a very strong regional flavor, we are in no way limited to the Michigan area. We have projects with Oak Ridge Laboratory, AT&T in Missouri, Western Electric in Louisiana, Nicolet Instruments in Wisconsin, United Airlines in Illinois, IBM in New York, and Dupont in Delaware.

The Educational Resource Center funds provide the basis that allows us to bring all of these disciplines together. The fund facilitates recruitment of the high quality faculty and the students and supports the students that are the core of these programs.

Now, an example of how these programs are aimed at national needs is in my three examples. First is hazardous waste. When Congress enacted the Superfund legislation in 1980, the assumption was that most of the technology, science and trained manpower required for the orderly conduct of the hazardous waste sites cleanup program was at hand. It is now clear that that is not true.

At the University of Michigan we approach the problem in several ways. For example, one of the research projects goes as follows. It is impossible to protect the community and the workers on the hazardous waste site if you don't know what is in the tanks and the drums. The methodology now available for finding that out, either very expensive and time consuming or gives very little information. We have a research project to develop advanced moderate-cost instruments that could be brought to a site and allow us to develop that information in a very short-time period. This instrument could also be used for air monitoring at a hazardous waste site.

In the area of education, we have developed a new graduate level curriculum to train both industrial hygienists and environmental engineers in hazardous waste, management and personal protection. Many students from both the School of Public Health and College of Engineering have enrolled in this course.

In addition, we have collaborated with NIOSH to develop a textbook and major continuing education lecture materials on this subject. We also have taken the lead in national and international efforts in this area.

Many of the industrial health and safety problems that we see in the United States today are addressed in the second problem, that of automotive production, my second example.

In the automotive production area, as in other areas, the approach in the past has been to put on a bandaid, to fix problems after they are diagnosed, after workers get ill or the community recognizes a problem. We are changing that approach and using an approach that involves building the engineering controls into the plants. Before the plants are even designed, we get involved in the design of the plant and in the avoidance of health and safety problems through proper design.

One of the projects that addresses that is that the UAW and Ford Motor Co. and the Center for Ergonomics at our ERC have initiated investigations into several areas that cause worker discomfort, reduce productivity, and lead to disabling costly injuries. For example, on the automotive production line, if you have walked through an assembly plant, you see many stages of assembly where the workers are reaching over their heads and putting caulking under the car or turning screws. Imagine working in that position all day every day.

We are doing research to develop better ways of fitting the production line to the worker's physical limitations. The project has led to design changes in several new automotive assembly plants such as those that will build the Ford Aerostar and Sable/Taurus cars.

In the education area in the automotive production area, we train a lot of graduate students. We also have a program to train 500 UAW trainers who will then return to their places of employment and implement OSHA's new hazard communications standards. These trainers will then teach the hazards associated with chemicals in the workplace to tens of thousands of UAW members.

In terms of national and international efforts, the faculty of the Center for Ergonomics are members of the GM-UAW occupational health advisory board, which oversees the occupational health programs for the half million GM employees and members of international organizations with similar intent.

The last example I would like to give you is in the area of semiconductor manufacturing. It is a widely held belief that the high technology industries of the future are environmentally clean and have few if any threats to worker safety and health. The semiconductor manufacturing industry illustrates the fallacy of such generalizations. Many of the process chemicals used in this industry are highly toxic, spontaneously combustible, and are gases, volatile liquids that can be very dangerous.

The number of health professionals specifically trained for this area are very few, and we have very high demand for our graduates in that area. We have a major research project with AT&T for monitoring of toxic gases in the semiconductor workplace. We have developed an educational program with an expert from AT&T to train future graduates in this area.

In summary, the program at the University of Michigan ERC has been outlined and showed to be interdisciplinary in nature, with major program areas draw from the School of Public Health, the College of Engineering, the Medical School, and the School of Nursing. Faculty skills available in the ERC include chemists, biologists, including radiation biologists, toxicologists, medical doctors, nurses, lawyers, and several types of engineers. The program is dedicated to research, graduate student teaching, service to the national and international scientific community, and continuing education of occupational health professionals, workers, design engineers, and managers.

We are in an area of a heavy concentration of industry which allows close cooperation with industry and labor.

An illustration of the types of programs that we undertake have been in the area of hazardous wastes, in the area of reconstruction of the traditional industrial base of the United States in this case in preventive design and intensive training in the automotive assembly area.

The third example addresses the area of health and safety hazards in an emerging high technology industry.

These three examples are used to illustrate the multidisciplinary nature of the program, the directions taken by the program, for the future, the types of graduate and continuing education programs offered, and the national and international scope of the program.

The support obtained from NIOSH through the ERC's during the last several years has provided critical resources which have allowed the development of these activities at the University of Michigan. This is not the only source of support, but the funds from the ERC grant form the basis for graduate and continuing education student support without which the programs in occupational health, industrial hygiene, and occupational safety engineering would wither.

Thank you for your attention.

[The prepared statement of Steven Levine follows:]

PREPARED STATEMENT OF STEVEN P. LEVINE, PH. D., CODIRECTOR, INDUSTRIAL HYGIENE PROGRAM, THE UNIVERSITY OF MICHIGAN

Mr. Chairman, members of the subcommittee I greatly appreciate the opportunity to speak to this committee on behalf of the academic programs in occupational health and safety. Specifically, I will briefly summarize the overall academic program structure as well as three specific projects at The University of Michigan NIOSH Educational Resource Center. I have chosen three projects to illustrate the importance of the ERC program to areas of national priority. These three projects are:

Hazardous Wastes.—Illustrates the role of the ERCs in the solution of the #1 environmental concern in the US.

Automobile Production.—Illustrates the role of the ERCs in the rebuilding of a major, traditional industry.

Semi-Conductor Manufacturing.—Illustrates the role of the ERCs in the high technology industries of the future.

The program structure of the NIOSH ERC at the University of Michigan is grounded in our experience that shows that both the best graduate educational system, and scientific and industrial problem solving resources, are based on a multi-disciplinary approach. They key components of this ERC are: 1. Occupational

Medicine; 2. Industrial Hygiene; 3. Occupational Safety Engineering; 4. Continuing Education; 5. Industrial Site Resources.

1. *Occupational Medicine*. The basic concept of this program is that occupational health problems can best be solved through prevention. This program stresses the diagnosis, surveillance, and prevention of occupational diseases, as well as their specific therapy where available. The program has two main components: the first is a non-residential program that allows MDs to maintain their professional practice while studying for an advanced degree in occupational medicine by coming to Ann Arbor for a 3 day period each month for 2 years. The second program component is a two year full-time residency in occupational medicine. This program maintains a clinic for diagnosis and treatment of workers, and has strong ties to both the family practice and internal medicine programs at the University Hospital.

An Occupational Health Nursing Program is being developed at the Michigan ERC, but is not yet operational.

2. *Industrial Hygiene*. From 1955 to 1984, 300 masters degrees and 25 doctoral degrees have been awarded. The program curriculum includes specializations in chemical hazards, erogonomics, general industrial hygiene, and ventilation engineering. There is a strong interaction with the Civil and Environmental Engineering Department for the hazardous waste projects, and with Industrial and Operations Engineering through the Center for Ergonomics.

(Ergonmics is the study of how to shape the workplace to fit the worker, rather than forcing the individual to adopt to the workplace.) Industrial Hygiene shares facilities, courses and leadership with the Occupational Medicine Program. In addition, courses are offered, and students are enrolled in joint programs in the areas of legal and regulatory issues, and in environmental chemistry.

Occupational Medicine and Industrial Hygiene are part of the Department of Environmental and Industrial Health in the School of Public Health. This department is strong, laboratory based and interdisciplinary and includes programs in Radiological Health, Toxicology, Environmental Health, Environmental Chemistry, Water Quality, and Environmental Policy. The faculty includes medical doctors, chemists, biologists, biochemists, toxicologists, physicists, lawyers and engineers. Thus, the students and faculty are part of a shared resource that provides a broad range of opportunities for interdisciplinary interaction.

3. *Occupational Safety Engineering*. This program is housed in the Department of Industrial and Operations Engineering in the College of Engineering. Students may choose from areas of specification such as Human Performance or Occupational Safety. Students of OSE are expected to develop skills in the following areas: ergonomics, safety engineering, industrial health, statistics, information processing, and management.

The OSE Program has over 9000 square feet of laboratory space for studies of occupational biomechanics, work physiology, cumulative trauma disorders, psychomotor skills, computer-aided work station design, safety engineering, work measurement, and work methods. This program, which annually offers instruction in ergonomics to 250 undergraduate and graduate students, has been recognized as a unique national center.

4. *Continuing Education*.—All faculty within the multi-disciplinary Michigan ERC contribute to the Continuing Education Program. Major courses offered by this program are: Occupational Ergonomics; Micro-Computer Applications in Occupational Health; Low Back Pain; Cumulative Trauma Disorders; Hazardous Waste Management and Worker Protection; Occupational Health Policy; Management Briefing Seminar (covering the areas of Ergonomics, Occupational Health Law, Chemical Hazards, and Reproductive Disorders in the Workplace).

These courses are an invaluable resource to industry, labor and government groups, who rely on continuing education programs for the updating, training and/or retraining of their employees.

5. *Industrial Site Resources*. The Michigan ERC has very strong ties with industry, labor and governmental groups, with persons from each of those groups serving on the Center Advisory Board. In addition, a high concentration of industries is located within an approximately 100 mile radius of Ann Arbor, Michigan (Dow Chemical Company; Automobile production facilities; Upjohn Pharmaceuticals; Steelcase Furniture; Flint Ink; and a variety of automotive parts, rubber and high technology companies). This allows close interaction with major production facilities for the purposes of research, training and continuing education.

This interaction is not limited to the immediate vicinity; there are major projects under way with Oak Ridge Laboratory (Tennessee), AT&T (Missouri), Western Electric (Louisiana), Nicolet Instruments (Wisconsin), United Airlines (Illinois), IBM (New York), and DuPont (Delaware).

Funding provided by NIOSH for this Educational Resource Center has allowed the development of these nationally and internationally respected programs in occupational medicine, industrial hygiene, and occupational safety engineering. The accomplishments of the ERC facilitates the recruitment of high quality faculty and students.

Examples of University of Michigan ERC projects that address areas of national need are reviewed next:

HAZARDOUS WASTES

When Congress enacted the Superfund legislation in 1980, the assumption was that most of the technology, science and trained manpower required for the orderly conduct of the hazardous waste sites cleanup program was at hand. It is now clear that there are significant unmet needs for technical personnel and for an increased level of laboratory and field research to obtain more data on health and environmental effects.

At the University of Michigan, the ERC has approached this problem in several ways:

1. *Research.* It is impossible to properly protect the community and hazardous waste workers during a site cleanup project without first knowing what is in the abandoned tanks and drums. Methods of analysis presently available are either extremely expensive and time consuming or provide little information of value for toxicologists and industrial hygieneists. Therefore, our research is directed at developing a new rapid method of hazardous waste analysis that involves the use of advanced instrumentation of moderate cost that could be taken directly to hazardous waste sites. During the development of this instrument, scientific advances are being made that improve the applicability of this instrument to monitoring of chemical contaminants in the air.

2. *Education.* A new graduate-level curriculum has been developed to train both industrial hygienists for a chemical hazards specialty and environmental scientists and engineers for a hazardous waste management specialty. Many students from both the School of Public Health and the College of Engineering have enrolled in this course. During the past two years, ten hazardous waste experts from around the country have been brought into our courses to lecture to our students.

A new textbook, "Protecting Personnel at Hazardous Waste Sites" was developed jointly by our program and by NIOSH. In addition, lecture materials were written for a NIOSH course on that subject, and a major effort aimed at the continuing education of state and county health professionals was made by the ERCs. A significant contribution to that effort was made by the Michigan ERC.

3. *National and International Activities.* The Michigan ERC co-founded and cochaired the new Hazardous Wastes Committee of the American Industrial Hygiene Association. The sessions held at the national (and state) conferences have been the most popular of all subjects among industrial hygiene professionals, consistently attracting approximately 500 attendees at the national conference hazardous waste sessions.

The Michigan ERC initiated the new Hazardous Wastes Subcommittee of the U.S. National Working Group on Analysis of Pollutants as part of the treaty activity carried out under the International Organization for Legal Metrology.

AUTOMOBILE PRODUCTION

Many of the industrial health and safety problems addressed in the past have been associated with "main line, heavy" industries. These include petrochemical plants, basic chemical production plants, metal foundries, mining, and automobile production. The approach was to diagnose a problem of worker or community health, and design a "fix" for the problem.

At the Michigan ERC, that approach is still used in the area of automobile production, but it is rapidly giving way to the concept of designing new production facilities to include engineering controls at the outset, and thus avoid health and safety problems later. This approach has been supplemented by an aggressive outreach educational program designed to avoid health problems by providing in-depth health and safety training to workers and management.

1. *Research.* In cooperation with the UAW and the Ford Motor Company, the Center for Ergonomics has initiated investigations into several areas which cause worker discomfort, reduce productivity, and lead to disabling costly injuries. For example, little is known about the adverse health consequences of working with hands overhead. Current research has been developed to help determine the effects of overhead work on productivity and shoulder problems. This project has led to design

changes in several new automotive assembly plants such as those that will build the Aerostar and the Sable/Taurus cars.

Low back injuries, the leading work related cause of disability among workers can be prevented by the use of a hoist or lifting assist. There is reluctance to use mechanical aids both by management and workers where manual lifting is possible, because hoists are awkward to use, require more time than manual lifting, and are expensive. Our research project seeks to design hoists which minimize operator time and effort. As a result of this type of research, faculty from the Center for Ergonomics are called on to review designs of machinery for use on new automated assembly lines.

In addition, research efforts in the area of adverse health effects will more fully document the real costs to both workers and industries of injuries. This will allow investment to be directed at the most hazardous jobs, with the aim of eliminating or modifying those jobs to protect the worker.

2. *Education.* The need to expand ergonomic programs in universities, govenment, and industry requires the training of PhD's who can provide leadership for this emerging field. This ERC program has focused on training this leadership group. Thirteen students are currently enrolled in the PhD program. In addition, more than one thousand students have attended continuing education courses on erogonomics in the last year.

The Center for Ergonomics will train 500 UAW trainers, who will then return to their places of employment and implement OSHAs new Hazard Communication Standard. These trainers will then teach the hazards associated with chemicals in the workplace to tens of thousands of UAW members. In a related effort, faculty from The Center have provided training in ergonomics to hundreds of automotive engineers and plant designers over the past three years.

3. *National and International.* Faculty from all over the world come to The Center for Ergonomics for additional research experience. The faculty provide consultation to American industry at their overseas locations.

Faculty of The Center are members of the GM-UAW Occupational Health Advisory Board which overseas the occupational health programs for the half-million GM employees. In addition, the faculty are members of international committees such as the Ergonomic Research Society of Great Britain, and the Permanent International Commission on Occupational Health.

SEMICONDUCTOR MANUFACTURING

It is a widely held belief that the high-technology industries of the future are environmentally clean and have few, if any, threats to worker safety and health. The semi-conductor maufacturing industry illustrates the failacy of such generalizations. Many of the process chemicals used in this industry are highly toxic, spontaneously combustible and gases or volatile liquids. Examples of these chemicals are the toxic gases arsine, phosphine and borane, the toxic liquids hydroflouric acid, phenol and ethyoxy ethanol esters, and the spontaneously combustible gas silane.

In addition, the number of health professionals specifically trained to be industrial hygienists in the semi-conductor industry appears to be inadequate to meet the demand for such specialists from such companies as AT&T, IBM, and Fairchild Semi-Conductors.

1. *Research.* A project has been initiated to develop an advanced instrument to rapidly identify contaminants in the air and report their concentration. This instrument is very sensitive, capable of detecting parts-per-billion concentrations of contaminants. It is also mobile, so that it can moved to problem areas in the workplace, if necessary, into the community. This instrument is based on the same concepts used for the instrument described for the analysis of hazardous wastes, thus showing how, in an ERC, many important problems may be solved through the cross-fertilization of major projects.

2. *Education.* A curriculum has been developed to include semi-conductor manufacturing processes and contaminant sampling and analysis methods into the masters degree program at the Michigan ERC. Recognizing this growing need for specific training in the semi-conductor occupational health field, an industry expert was invited to participate in the formulation of appropriate course material.

Many of our students have found employment, either for permanent or summer positions, in the semi-conductor industry. The demand for these students exceeds the supply.

3. *International.* During the past month, preliminary discussions were held in Shanghai with Shanghai First Medical College, the People's Republic of China, to

coordinate research projects in the field of industrial health related to the computer industry.

SUMMARY

The program at The University of Michigan NIOSH ERC has been outlined and shown to be interdisciplinary in nature, with major program areas drawn from the School of Public Health, the College of Engineering, the Medical School and the School of Nursing. Faculty skills available in this ERC include chemists, biologists, toxicologists, medical doctors, nurses, lawyers, civil engineers, industrial engineers, and safety engineers.

This program is dedicated to research, graduate student teaching, service to the national and international scientific community, and continuing education of occupational health professionals, workers, design engineers, and managers. The Michigan ERC is in an area with a heavy concentration of industry, which allows close cooperation with these industries. Despite the close regional ties, this ERC has efforts underway in many areas of the U.S.

An illustration of the types of programs undertaken at this ERC has been presented using three important examples:

1. The first example addresses the area of hazardous wastes which could be considered the #1 area of environmental concern in the U.S. today.
2. The second example addresses the area of the reconstruction of the traditional industrial base of the U.S., with an emphasis on preventive design and intensive training, rather than on the approaches of retrofitting after problems are recognized, or of treating the worker for the health effects caused by uncorrected hazards.
3. The third example addresses the area of health and safety hazards in an emerging, high-technology industry.

These three examples are used to illustrate:

The multi-disciplinary nature of the programs.

The direction taken by, and accomplishments of, research programs.

The types of graduate and continuing education programs offered to train professionals in these areas.

The national and international scope of this program.

The support obtained from the NIOSH Educational Resource Center grant during the last several years has provided critical resources which have allowed the development of these activities at The University of Michigan. The cost of supporting ERC faculty salaries and equipment purchases is paid, in part, by the university, industry and unions, However, the funds from the ERC grant form the basis for graduate and continuing education student support, without which the programs in occupational health, industrial hygiene, and occupational safety engineering would whither.

Mr. Chairman, Members of the Subcommittee: Thank you for allowing me to speak to you today.

Mr. GAYDOS. Thank you, Mr. Levine, for an excellent statement. We probably will be calling upon you, too, maybe to give us some additional detailed information or direction and maybe analysis involving our new bill on notification of high risk areas.

I am very surprised to hear all three of the witnesses so far expound on just how much has been done in this area. I had reservations that this wasn't going on. It is pleasantly surprising that so much work is being done in these centers. I didn't realize it. I had visualized some superfluous type of a program, maybe just enough to qualify for Federal funds, what little there are, and things like that. I am very pleasantly surprised.

I really sincerely hope that my colleagues will take time to read the printed record, because all three of you so far have been very practical in your approach. You have left a lot of avenues open. If somebody wants to make inquiry, you have left the door open for them. They can get in there and get the specific detailed information.

Mr. Levine. As Dr. Corn pointed out, it is a widely held belief that the ERC Program is the strongest and most valuable of all of NIOSH's programs.

Mr. Gaydos. Is that right? It sounds good.

Mr. Spear. Particularly amongst ourselves. [Laughter.]

Mr. Gaydos. Without any more self-serving declarations, Mr. Spear, you have the floor.

STATEMENT OF ROBERT SPEAR, DIRECTOR, NORTHERN CALIFORNIA OCCUPATIONAL HEALTH CENTER, UNIVERSITY OF CALIFORNIA, BERKELEY, DAVIS, AND SAN FRANCISCO

Mr. Spear. I am here in the dual capacity as director of an ERC and as this year's president of the Association of University Programs in Occupational Health and Safety, which represents all 14 of the ERC's nationally.

Dr. Corn, of course, has served in that capacity in the past. I am this year's president, and Jeff Lee is next year's president. In the fullness of time, no doubt Dr. Levine will be president in his turn.

I am going to address the bulk of my remarks to describing the programs of the Northern California Occupational Health Center in order to expand further on the picture my colleagues have already painted of the activities of our centers in teaching, research, and service to our respective communities and to our contributions to this area of scholarship and professional practice in perhaps more general terms.

The Northern California Occupational Health Center and its counterpart in southern California are integral parts of the University of California system. The northern center is comprised of four academic programs and a service/outreach component which are located at the Berkeley, Davis, and San Francisco campuses of the university. We have academic programs in occupational medicine at both San Francisco and Davis and nursing at San Francisco and industrial hygiene at Berkeley. There are both teaching and research activities in epidemiology and toxicology relevant to occupational health at all three campuses that are either part of or closely linked to our center.

The California occupational health centers are unique in the country, as far as I know at least, in that we have significant resources allocated as a line item in the base budget of the University of California. This occurred in 1981 after a period of development under the aegis of the California Department of Industrial Relations. The CDIR director at that time, Donald Vial, recognized the importance of bringing occupational health concerns into the mainstream of the university's teaching and research programs in order to attract outstanding faculty and students who will devote their energy and skills to improving the health of workers in California and in the Nation.

In 1982 the northern center also became a NIOSH ERC. Because of our State support, we are able to commit a large percentage of the NIOSH funding to direct student support rather than support of faculty and staff, as most other centers are constrained to do. These Federal funds for direct student support have been as important to us as they are to our less well funded colleagues because we cannot use State funds for these purposes, and the ability to support students is very important to national needs in this field, for reasons I will subsequently mention.

The new commitment that came with the NIOSH ERC was to continuing education in the various fields of occupational health. This added component has resulted in a center with academic programs at the graduate level, continuing education programs for professionals already in the field, and a State-supported labor education and outreach program. We presently graduate about 15 occupational health nurses, 12 industrial hygienists, and 6 to 8 students in the related areas each year. There are currently seven residents in the occupational medicine program. We expect to reach a steady state of about 12 in the next several years.

We have sponsored 28 continuing education courses this last year, with over 900 total attendees.

To give some sense of our activities and impact both inside and outside the university, I would like to offer some recent examples in each of the three areas of teaching, research, and service.

The most exciting new development in the area of teaching is the incorporation of the occupational health clinic at the San Francisco General Hospital into the center as the principal site for interdisciplinary or multidisciplinary teaching. This clinic has been funded by the Kellogg Foundation for the last few years as a site where nursing students, the industrial hygiene students, and the medical residents can all come together to deal both with the patients and with the work environment which caused these workers to seek medical care. By next fall, all of the students in the programs I have just mentioned will rotate through the clinic. And reports from both the students and the faculty so far are uniformly enthusiastic over this learning experience.

It now appears that our State funding will be augmented to make this program a permanent part of the center in the 1986–1987 budget year, and the Kellogg Foundation has just extended its grant to bridge the gap until State funding is available. This just underscores what my colleagues have already said about the multidisciplinary nature of our activity and the fact that the whole really is greater than the sum of the parts, or at least can be made to be so.

It is not difficult for me to site examples of service activities in which our faculty and students are involved. As you have heard, this is also the case at other centers around the country. It is my suspicion that this is an area of major impact of the ERC Program and one that is not reflected in terms of the usual measures of productivity of academic programs. That is to say, it is easy for us to talk about manpower needs and the great need for manpower in occupational health and the number of people we turn out and how many workers they impact. But much less easily documented is the impact of our programs at the State, local and regional levels in dealing with industry, with labor, and with the professions. I will just give a few examples here of contributions of our faculty on advisory committees and professional activities at both the State and Federal levels.

Marc Schenker, one of our colleagues in medicine, is on the scientific review panel for the California Air Resources Board, which is a new initiative which is both a politically and technically important activity in California. Professor Barbara Burgel has been nominated by the American Nurses' Association to serve on the Department of Labor's National Advisory Committee on Occupational Safety and Health. Another of my colleagues, Allan Smith, is conducting a review of the cancer incidence in Contra Costa County, an industrial county very close to our ERC, at the request of the county government, who find this both a technically and politically vexing problem. Steve Rappaport will soon be serving on a NIOSH study section. And I have been involved with OTA activities associated with reproductive hazards in the workplace.

Already today you have heard others mention these things. Mort Corn mentioned OTA, with whom he has been very active, and very active, of course, in all these areas. The American Conference of Governmental Industrial Hygienists is a very important national body in the area, as far as both professional practice and policy is concerned, and Mort, of course, has been president of that. And Jeff Lee, I think, will be in the next year or so. So, this is an extraordinarily important area of contribution of our faculty. Indeed our students are also involved. Also, as I note in my written testimony, I can recall at least five of our faculty who have advised various California legislators in the last few months on issues of concern to them.

I might mention, with respect to the bill that you have been discussing, Mr. Chairman, that there is a very similar bill existing in the California legislature obviously modeled after this bill 1309. We have been working with the people in California around issues surrounding at least their interpretation of that bill.

The foregoing service activities do not include the very successful Labor Occupational Health Program, which is part of the Northern Center. NIOSH, as you know, is prohibited from expending funds directly related to worker education. This was restricted to OSHA and with the effective demise of the New Directions Program, there is not a lot of that left. But we happily have been able to secure or have secured from the outset of the Northern Center, State funds to provide consultation and assistance to labor groups in our area through the Labor Occupational Health Program. And LOHP's training materials, in particular, have received nationwide distribution as well.

In the last few months, they have conducted a week-long training course for 30 health care workers, a 1-day conference on the California workers compensation system for 140 participants, and an intensive week-long course on health and safety for 25 labor and management officials from the petrochemical industry. In addition to major events such as these, they provided more than 30 other training programs serving more than 1,000 individuals this past year. These are basically workers, shop stewards, and the like. We are not talking here about professionals; this is basically focused on worker education and service mainly to the trade unions.

This program is also a principal mechanism for involving students in service activities. For example, the industrial hygienist at the LOHP has been supervising students from the School of Public Health's industrial hygiene program and working with a study among Muni bus drivers in the San Francisco area.

Research is the third essential element of a strong graduate program. Until recently, research has not been an area of emphasis in the ERC Program nationally, although it has certainly been so at many of the individual centers. While our center has some very productive researchers, it is my view that research is the area which we must develop more vigorously. This is true not only of our center but true of most ERC's and indeed the occupational health and safety establishment in general.

This year our association in collaboration with NIOSH proposed an increased emphasis on research in the ERC's. We anticipate that this initiative will result in a new commitment at least among ourselves to the development of knowledge and creative solutions to the health and safety problems faced by the Nation's workers. Jeff Lee mentioned this initiative as well. I think it is a very important one and one which we would be pleased to submit at least a description of to your committee.

Whether in the workplace or the community, research on disease and injury prevention—and I underline prevention here—has been chronically underfunded in this country. I would suggest that this committee would do a service to the workers of the Nation by inquiring further into this issue. What I am suggesting basically is research on prevention as opposed to the treatment of disease. If you look in the Federal budget, you will find that millions and millions and millions of dollars are spent on curative medicine research, which of course is appropriate. But on the other hand, I think research on disease and accident prevention, not only in the occupational setting but in the community as well, is very much underfunded and has traditionally been.

I would be doing my colleagues in the northern center a disservice if I did not follow these rather negative comments I have made with a few illustrations of important research going on in our center. Some of us have been working for about 3 years, mainly under the sponsorship of the American Petroleum Institute, on new approaches to characterizing the exposure of workers to airborne toxicants. This work is of a theoretical nature, but it has led us to conclude that the procedures now followed by OSHA in defining compliance with exposure standards for toxic airborne agents have serious flaws. This is a very interesting area, an important area of research, which brings together statistical theory, new air sampling technologies, and occupational health policy issues.

Another of my colleagues has been working on the application of cytogenetic techniques, the biological monitoring of workers, with the object of developing methods of early detection of adverse exposures to chronic or delayed toxic agents. This work presents a good example of the cross-fertilization that can occur in an interdisciplinary setting.

One of the faculty of the medical program heard a seminar on the new experiments proposed in the cytogenetic area and for some reason which is not clear to me, suggested a piggyback experiment to look at the neurotoxicity of the agent being studied, that is to say, a completely different end point than that which the original researcher was interested in. And early indications are that this agent does have neurological effects that have not been previously reported. So, this is a rather technical example of this interdisciplinary or cross-fertilization in this particular setting, in the toxicology area.

We are also involved in epidemiological and clinical investigation similar to others that have been described today. But I would like to conclude my remarks on research by mentioning a project which to me typifies what we should be about.

One of our Ph.D. students is engaged in research on new methods of sensing airborne chemical agents which utilize the most recent advances in solid state technology. His work is funded by a gift from Dow Chemical. It is being carried out in the electrical engineering department at Berkeley with the kinds of sophisticated equipment and support available in that Department that could never be provided with the level of funding available to most occupational health researchers. This work is an example of the kind of brokering of the cutting-edge research going on in the basic sciences and engineering into application in occupational safety and health.

I earlier implied that continued Federal support of the academic enterprise in occupational health and safety remains essential. By any reasonable measure, NIOSH's Extramural Research Program is today and has for years been underfunded. Over the last 5 years my colleagues and I have presented testimony to the Congress on numerous occasions concerning the importance of continued funding of the ERC Program as the foundation of training and education in these fields. I suspect that the continued difficulty of obtaining support in these areas is that the essence of occupational health and safety is that its focus is on injury and disease prevention. This is a theme that I will echo again, that my colleagues have already raised.

The cost effectiveness of prevention is notoriously difficult to document. We can't bring before you today particular workers from the Nation's factories or farms who can testify that the quality of their lives and work is good and satisfying because we prevented that awful accident that would have rendered them disabled for life. A corollary is that preventive medicine is not as sexy or attractive to most physicians as curative medicine. Occupational physicians are not the people who reassemble severed limbs or implant the remarkable new fruits of technology that prolong life. Hence, to opt for a career in occupational medicine requires a commitment to a career path with modest esteem in the eyes of the medical profession as a whole and one in which the prospects for remuneration are more limited as well.

A practical manifestation of this situation is that it is hard to bill for a disease prevented. Residency programs in which occupational physicians are trained are very difficult to support in the way that most teaching hospitals support their house staff. I can state categorically that even our center, one of the best funded in the country from State sources, could not now offer a viable occupational medical residency without NIOSH support.

In conclusion, I feel the ERC Program is a success. We are certainly fulfilling the original mandate in training. We are beginning to focus more specifically on the needs for research in these fields.

In this latter area, I would be less than candid if I did not say that I feel we have a way to go. However, in view of the limited national resources devoted to research in occupational health and safety, we have probably done a creditable job of what we have had to work with.

Finally, our contributions to the occupational health and safety activities in our local regions have been significant. I am proud of the contributions of our center in California, and you have heard testimony today which proves ours is not an isolated case. We look forward to an even more productive future in collaboration with NIOSH and with our colleagues in labor and industry.

Thank you.

[The prepared statement of Robert Spear follows:]

Prepared Statement of Robert C. Spear, Ph.D., Director, Northern California Occupational Health Center, University of California

Chairman Gaydos, I appreciate the opportunity of testifying before the Subcommittee today on the status of the Educational Resource Center program of the National Institute for Occupational Safety and Health. I am here in the dual capacity of a director of an ERC and the President of the Association of University Programs in Occupational Health and Safety which represents all of the 14 ERC's in the nation. I will address the bulk of my remarks to describing the programs of the Northern California Occupational Health Center in order to expand further on the picture my colleagues have already painted of the activities of our centers in teaching, research and service to our respective communities and our contributions to this area of scholarship and professional practice in more general terms.

The Northern California Occupational Health Center and its counterpart in Southern California are integral parts of the University of California system. The Northern Center is comprised of four academic programs and a service/outreach component which are located at the Berkeley, Davis and San Francisco campuses of the University. We have academic programs in occupational medicine at both San Francisco and Davis, in nursing at San Francisco, and in industrial hygiene at Berkeley. There are both teaching and research activities in epidemiology and toxicology relevant to occupational health at all three campuses that are either part of or closely linked to our center.

The California Occupational Health Centers are unique in the country in that we have significant resources allocated as a line item in the base budget of the University of California. This occurred in 1981 after a period of development under the aegis of the California Department of Industrial Relations. Its Director at that time, Donald Vial, recognized the importance of bringing occupational health concerns into the mainstream of the University's teaching and research programs in order to attract outstanding faculty and students who will devote their energy and skills to improving the health of the workers of California and the nation.

In 1981 the Northern Center became a NIOSH ERC. Because of our State support we were able to commit a large percentage of the NIOSH funding to student support rathar than support of faculty and staff as most Centers are constrained to do. These federal funds for direct student support have been as important to us as they are to our less well-funded colleagues because we cannot use State funds for these purposes and the ability to support students is very important to national needs in this field for reasons that I will subsequently address.

The new commitment that came with the NIOSH ERC was to continuing education in the various fields of occupational health. This added component has resulted in a center with academic programs at the graduate level, continuing education programs for professionals already in the field and a state supported labor education and outreach program. We presently graduate about 15 occupational health nurses, 12 industrial hygienists and 6 to 8 students in the related areas each year. There are currently 7 residents in the occupational medicine program. We expect to reach a steady state of 12 residents in the next several years. The Northern California Center sponsored 28 continuing education courses this last year with over 900 total attendees.

To give a sense of our activities and impact both inside and outside the University I would like to offer some recent examples in each of the three areas of teaching, research and service. The most exciting new development in the area of teaching is the incorporation of the Occupational Health Clinic at the San Francisco General Hospital into the Center as the San Francisco General Hospital into the Centr as the principal site for multi-disciplinary teaching. This Clinic has been funded by the

Kellogg Foundation for the last few years as a site where the nursing students, the industrial hygiene students and the medical residents can all come together to deal with both patients and the work environment which caused these workers to seek medical care. By next fall all of the students in the programs I just mentioned will rotate through the clinic. Reports from both the students and faculty are uniformly enthusiastic over this learning experience. It now appears that our state funding will be augmented to make this program a permanent part of the Center in the 1986-87 budget year and the Kellogg Foundation has just extended its grant to bridge the gap until the state funding is available.

It is not difficult for me to site examples of service activities in which our faculty and our students are involved. As you have heard this is also the case at other centers around the country. It is my suspicion that this is an area of major impact of the ERC program and one not reflected in terms of the usual measures of productivity of academic programs. My colleagues in the Northern California Center serve on a wide variety of advisory committees at both the State and Federal level. Some examples that come to mind are: Dr. Marc Schenker is on the Scientific Review Panel for the California Air Resources Board; Professor Barbara Burgel has been nominated by the American Nurses' Association to serve on the Department of Labor's National Advisory Committee on Occupational Safety and Health; at the request of the Contra Costa county government Dr. Allan Smith is conducting a review of high cancer mortality rates occurring in that county; Robin Baker is a member of Cal/OSHA's committee to assess outreach/education in California; Dr. Stephen Rappaport is serving on a NIOSH study section; and I am a member of an advisory panel on reproductive hazards of the workplace for the Office of Technology Assessment of the Congress and I also chair the advisory committee for California's Hazard Evaluation Service and Information System. I can also recall at least five faculty members who have advised various California legislators in the last few months on issues of concern to them in the area of occupational health.

The foregoing service activities do not include the very successful Labor Occupational Health Program (LOHP) which is part of the Northern Center. Its mission is to provide consultation and assistance to labor groups in our area, although their training materials, in particular, have received nation-wide distribution. In the last few months they have conducted a week-long training course for 30 health care workers, a one-day conference on the California workers' compensation system for 140 participants and an intensive week-long course on health and safety for 25 labor and management officials from the petrochemical industry. In addition to major events such as these, they provided more than 30 other training programs, serving more than 1,000 individuals during this past year. This program is also a principal mechanism for involving students in service activities. For example, the industrial hygienist based at LOHP has been supervising students from the School of Public Health's industrial hygiene program in the collection of environmental monitoring data for an ongoing study on stress and hypertension among San Francisco MUNI bus drivers. In addition, three students from various disciplines gained practical experience in the field of occupational health and safety by doing internships at LOHP last year.

Research is the third essential element of a strong graduate program. Until recently research has not been an area of emphasis in the ERC program nationally although it has certainly been so at many of the individual centers. While our center has some very productive researchers it is my view that research is the area which we must develop more vigorously. This is true not only of our center but true of most ERCs and, indeed, the occupational health and safety establishment in general. This year our association, in collaboration with NIOSH, proposed an increased emphasis on research in the ERCs and we anticipate that this initiative will result in a new commitment, at least in the ERCs, to the development of knowledge and creative solutions to the health and safety problems faced by the nation's workers. Whether in the workplace or the community, research on disease and injury prevention has been chronically underfunded in this country and that this committee would do a service to the workers of the nation by inquiring further into this issue.

I would be doing my colleagues a disservice if I did not follow those rather negative comments with a few illustrations of important research work going on in our center. Several of us have been working for about three years, mainly under the sponsorship of the American Petroleum Institute, on new approaches to characterizing the exposure of workers to airborne toxicants. This work is of a theoretical nature but it has led us to conclude that the procedures now followed by OSHA in defining compliance with exposure standards for toxic airborne agents have serious flaws. It is a very interesting area of research which brings together statistical theory, new air sampling technologies and occupational health policy issues.

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We are also involved in epidemiological and clinical investigations similar to others that have been described today but I would like to conclude my remarks on research by mentioning a project which, to me, typifies what we should be about. One of our Ph.D. students is engaged in research on new methods of sensing airborne chemical agents which utilizes the most recent advances in solid state technology. His work is funded by a grant from Dow Chemical. It is being carried out in the Electrical Engineering Department at Berkeley with the kinds of sophisticated equipment and support available in that Department that could never be provided with the level of funding available to most occupational health researchers. This work is an example of the kind of brokering of the cutting-edge research going on in the basic sciences and engineering into application in occupational health and safety.

I earlier implied that continued federal support of the academic enterprise in occupational health and safety remains essential. By any reasonable measure NIOSH's extramural research program is today, and has for years been underfunded. Over the last five years my colleagues and I have presented testimony to the Congress on numerous occasions concerning the importance of continued funding of the ERC program as the foundation of training and education in these fields. I suspect that the continued difficulty of obtaining support in these areas is that the essence of occupational health and safety is that its focus is on injury and disease prevention. The efficacy or cost effectiveness of prevention is notoriously difficult to document. We cannot bring before you today particular workers from the nation's factories or farms who can testify that the quality of their life and work is good and satisfying because we prevented that awful accident that would have rendered them disabled for life. A correlary is that preventive medicine is not as sexy or attractive to most physicians as curative medicine. Occupational physicians are not the people who reassemble severed limbs or implant the remarkable new fruits of technology that prolong life. Hence, to opt for a career in occupational medicine requires a commitment to a career path with modest esteem in the eyes of the medical profession as a whole and one in which the prospects for remuneration are more limited as well. A practical manifestation of this situation is that it is hard to bill for disease prevented, and residency programs in which occupational physicians are trained are very difficult to support in the way that most teaching hospitals support their house staff. I can state categorically that even our Center, one of the best funded in the country from State sources, could not now offer a viable occupational medical residency without NIOSH support.

In conclusion, I feel that the ERC program is a success. We are certainly fulfilling the original mandate in training and we are beginning to focus more specifically on the needs for research in these fields. In this latter area I would be less than candid if I did not say that I feel we have a long way to go. However, in view of the limited national resources devoted to research in occupational health and safety we have probably done a creditable job with what we have had to work with. Finally, our contributions to the occupational health and safety activities in our local regions has been significant. I am proud of the contributions of our center in California and you have heard testimony today which proves ours is not an isolated case. We look forward to an even more productive future in collaboration with NIOSH and with our colleagues in labor and industry.

Mr. GAYDOS. Thank you, Doctor.

What is impressive to me is that all four of you have been uniform in your approach to the problem. I am sure you are not exchanging notes, you just set up your own program.

Let me ask you a practical question. Since the administration in the last 4 or 5 years has indicated a zero here, do you think you are doing any duplication, as has been claimed, that what you are doing down there at Johns Hopkins might be being done out there at Berkeley? What about that accusation or criticsm?

How many centers do we have throughout the country?

Mr. **Spear**. There are 14.

Mr. **Gaydos**. Fourteen.

Mr. **Spear**. Let me respond by saying that I think one of the things that——

Mr. **Gaydos**. I want to make an argument on it. Tell me what to say and how logical you can be. Give me some facts.

Mr. **Spear**. I think one of the things that you have heard today is that we all have a very considerable regional focus, that the problems we deal with are generic and shared from one place to the other. But, for example, the emphasis at Michigan on the automobile industry and ergonomics is certainly not one that you will find duplicated at any of the other centers as far as I am aware.

Similarly, Utah has some programs in the mining industry which are relatively unique to their center and program. We do a lot of work, though certainly we are not unique, in the agriculture area. But in California, of course, agriculture is a major industry. We have lots of different activities there.

So, I think that you will find the only thing that we are duplicating is, hopefully, turning out well-trained professionals to come into the field and make a contribution. But in terms of the individual emphasis and particularly in research, I think you will find that there is relatively little duplication.

Mr. **Gaydos**. Yes?

Mr. **Corn**. I would answer that by stating that this Nation has over 100 engineering schools and I don't know how many medical schools and how many law schools. Are they duplicating each other? They are each serving the needs of their region, Nation, and some of them the world because the needs are great. Within the research frameworks of those schools, they have fingerprints which characterize each of them. We are analogous to that.

So, if anything, we are spread very thin. I cover region three. We are tied in a little bit with two or three States in region three, but we can't reach all of that. It is impossible. So, I would say we are not duplicating. There are similarities that suggest that to people. The analogy to other educational institutions might clarify that concept to them.

Mr. **Gaydos**. I was going to ask the question before you answered, I think you have answered it, as to whether or not you would advocate, any of you, some kind of uniformity. Don't forget, the engineer that graduates from Berkeley can be called upon to do exactly the same thing as the engineer from the University of Pittsburgh or MIT. There is a uniformity of requirements or standards set up, you know, certain prerequisites that you must complete before you are stamped as an engineer with a degree to build a building 80 stories high, whether they build them in Pittsburgh or Venezuela, or what have you. You are dealing with something a little different.

I was going to ask——

Mr. **Corn**. We are getting there. We are getting there. We have it in medicine. We are on the verge of putting it in place in industrial hygiene. And I am not quite sure where the nursing effort is.

But this is accreditation, and we are so far accredited in one, on the verge of accrediting the second area; and there are two more to go. I believe that is a fair statement.

Engineering is older. Some of the fields we are teaching in are infants in this accreditation development. But it is coming. We have to do that. We have to assure the public there is a minimum level of competence, regardless of which institution you take a degree at.

We are aware of it. We are working on it. It is not easy. The doping out of these requirements between multi-institutions requires a lot of give and take. But we are doing it.

Mr. Gaydos. Does somebody want to respond?

Mr. Lee. I think, despite the unique interests and capabilities that we have, I think also, if you look in detail at the basic training programs that we do have in place for industrial hygiene, physicians, nurses, our safety people, you would find a remarkable amount of similarity. I feel very comfortable with employing an industrial hygienist that is trained at Johns Hopkins University, for example. I think the basic fundamental skills are present at all of our ERC's.

Mr. Gaydos. I noticed an awful lot of, not repetition, but all of you seem to be uniform in that you have put on some practical training, whether it's a condensed course for a week or a day or periodically, night school, what have you. I don't know how you do it. But you will take the workers at a plant, for instance, you will take them and you will give them a special course. You say they go back and they can then teach, lead, and explain to their fellow workers; and they are doing a service. Now, that's almost like on-the-job training.

Here is a practicality someone may raise. If I am here and I had a business activity here in this area, should I or would I not be better off going to a local place like Hopkins and say, well, that's going to be a more attuned person than to go out to Berkeley and consider one of your applicants that maybe put in an application with me, you see?

Would you give an example for the committee so, hopefully, my colleagues when they study this record will at least be exposed to it? Would you give me a little better explanation as to when you call in to your program, say, the foreman on the assembly line in one of the automobile production plants, what does he learn there in a week? Say he takes that week course. What does he learn?

Mr. Spear. Let me respond first to that. I want to make a careful distinction here that is made, the OSHA/NIOSH business. In my testimony I briefly alluded to the fact that none of the NIOSH funds we receive can be used for worker education. That is completely verboten.

Mr. Gaydos. You said that. All of you have said that repeatedly in your statements.

Mr. Spear. Yes, that is an important issue, because the NIOSH funds can only be used for professional education in the areas that we have mentioned.

We are fortunate in California because we do have State funds that we can directly use for worker education. And other people do worker education with different funds but simply not with NIOSH funds.

Mr. GAYDOS. Following that distinction, would you recommend—and you can get back here, I don't want to interrupt your thought—would you recommend that we change that——

Mr. SPEAR. I'm not——

Mr. GAYDOS [continuing]. Let those funds be available for worker education?

Mr. SPEAR [continuing]. I think there is a great need, I think there is definitely a need for Federal funds to be used for worker education. Now, whether they come through NIOSH or elsewhere, that is another issue. They came through OSHA as part of the New Directions Program. I think that that was money well spent. And I think that it would be useful to other ERC's to have some activities in worker education.

One of the reasons is because many of our students very shortly after they get into the field find themselves engaged as a principal activity in worker education. Industrial hygiene students in particular very often find the first year they are in the field, that what they are doing is providing classes for workers. And of course, very often they are not prepared to do that. They don't know how to talk to workers.

So, we are trying to set up an arrangement in our center, because we have the State funds, where the students will rotate through the Labor Occupational Health Program and learn how to talk to workers, get rid of that jargon, come down home and talk to them about their concerns and how they can deal with their environment. I think that that is an important thing that should be expanded, if necessary, with Federal support.

Mr. GAYDOS. New Directions was Dr. Bingham's brainchild, wasn't it, if I remember correctly?

Mr. SPEAR. Mort can speak to that.

Mr. GAYDOS. Can you tell me a little bit about it? What was the concept again of it? That was the educational end of it?

Mr. CORN. Yes; it was a very fine effort, deserves a great deal of credit. It was to give money to private institutions to worker organizations, to others who would raise the level of understanding of the worker. And it caught on.

Perhaps the really only good side effect of this current period that I refer to in my testimony as benign neglect has been a philosophical coming to awareness of the part of the American work force that they can't depend on the Federal Government. Now, expectations for OSHA were always extraordinarily high. OSHA did a great deal but never met expectations. But this last 4 years, the labor movement has said: we must put forth an extraordinary effort to protect ourselves. Look what has happened to the Federal Government. It has gone into hibernation.

If we have the information, if we have the understanding, we can help ourselves. And maybe it will get better in the future, but this is what is needed.

That is where the right-to-know movement comes from, and it is a gut-level movement. Its roots were a new direction. I believe the labor movement learned with New Directions. We can teach ourselves a lot.

Traditionally the labor in this country, the worker has been in the hands of management. The law holds the employer responsible, take care of your employees. We are going through a period now where employees are saying: fine, hold the employer legally responsible; but we're going to learn one hell of a lot to take care of ourselves out there. And therefore, the demand for education of employees can only go up as the right-to-know laws take effect.

That is why I think these right-to-know laws are the most important thing to happen in this field since the act.

The fact the administration delayed and only passed a hazard communication standard after the States were passing theirs with the lobbying of labor and then passed an inadequate Federal hazard communication moves the Federal Government aside. The real force out there are the State laws. And some of them are very demanding. And they are going to get information to the work force. And more information means more expectations concerning coverage.

So, this right to know is like an infant. It's not even up and walking yet, but it is going to have profound effects, of which education of the work force is going to be a big one.

Mr. Gaydos. Of course, I know you appreciate the committee's problem. One of the problems of the many we have is that we are trying to salvage something in a period of austerity where there are great cuts, $40 billion over the last 3 or 4 years in areas such as this, what we call social services, as distinguished from, say, military and some other types of commitments. We are just trying to keep together, trying to keep a string on things, hopefully have them poised for maybe some future occurrence whereby the philosophy may change.

As far as the importance of OSHA and MSHA, those two safety acts, you know, came into being quite recently, as acts go. They have been the main focal point for the administration to cut funds. We are just hanging on.

Mr. Corn. I agree. I am encouraged that they haven't been done away with. They are there, and they are in the wings. They are ready to get started up again, but they are certainly in low gear now.

What do people covered by these, who look to these acts for relief and for protection, what do they do? I guess they are doing the only thing they can do, but it didn't occur to them before: we'll do our damnedest to take care of ourselves. And that's what this right to know is all about.

I think it is a wonderful development. It makes the employee an equal with the employer by sharing in the knowledge. And if you share in the knowledge, you have a lot of leverage and a lot of capability or potential for doing things in that environment. So, I am a very strong supporter of this right to know. I think it's a wonderful development.

Mr. Spear. But there's another side to the right-to-know question, too. It does generate a real demand for information that is tailored for the worker. My sense of it is that there are not a lot of people out there at this point who have the resources to respond to that demand. We get continual calls. The VDT business is an excellent example of a concern that is held by workers that engenders a tremendous demand for information. It is a sufficiently ambiguous problem that the information you are going to give them is difficult to package in such a way as to respond to their needs but at the same time try to give an adequate picture of what we know and what we don't know.

So, I think there is definitely scope for activities in worker education to respond to the very strong tide that Mort alludes to that perhaps is being engendered by the right-to-know laws.

Mr. **Gaydos**. Is this the way to do it, as we are doing it up until now? You four gentlemen here, we are talking about what programs you have in effect. Is this the way to do it? Would you have any recommendations or suggestions to the committee where we may change it somewhat?

I know you say enlarge it and make more funds available. I wish I could wave that magic wand, but unfortunately I can't, nor can the committee under these precarious budget circumstances.

Do you think that we are on the right track, that what you are doing is a harbinger of what should be done in the future when and if a philosophical change occurs in the administration or a succeeding administration?

The reason why I ask is because you are all located in different geographical areas. I know that it is a big country, but sometimes we leave ourselves open to the accusation of duplication, you know, and non-cooperation and things like that if you don't call each other up and check your programs: oh, what they're doing out in Berkeley is a waste; Hopkins says, oh, we have the answers. So, you've got that type of a situation.

I imagine that, as you have said, you have to be very dedicated to get into this specialty. The remuneration isn't there in comparison to what a medically educated person, a trained person can hope to achieve in his career. It's not there. There's no comparison. So, you really have to have a sincere innate desire to want to be a hygienist or a scientist with a degree in science and to go out there and work among workers with a very probably limited horizon because you can only go so high in promotions and that's the end of it. You have to have some great satisfaction that you are helping people, otherwise you gravitate to other more lucrative areas.

You are the vanguard of the whole approach to this problem, if you want to call it a problem. I didn't know that we were doing so much. I will be very frank with you. There was reference to the centers, we talked about them, but I didn't until this morning, with you four gentlemen coming, know just exactly what was going on and the intense desire to make it work and the accomplishments and the uniformity of programs like you were talking about.

Mr. **Spear**. I think one area that deserves mention again, because it goes to the core of the enterprise, is this area of research. We have talked a lot about service activities and the sort of direct workplace involvement of what we do. But for the kind of programs that we are trying to foster to survive successfully in a university setting, particularly at the major research universities, research is really a key issue.

It has not been an emphasis of the ERC Program until recently, as we mentioned. I think that we have to develop more fully with more vigor our research programs because those programs are the ones that are going to put us into the fabric of the universities that we come from. There is no question that some of the ERC Programs are sort of tacked on to their universities as federally funded add-on programs but are not seen as perhaps being in the mainstream of the university's responsibilities and its health sciences programs in particular.

I think that the road to legitimacy is through vigorous and productive research activities. In the long term, if we are going to wean ourselves from the dependence on Federal support, it is going to be with strong research programs. It is also the way that we are going to compete for those institutional resources that are available. This depends a lot on the institution. At the private universities, they are never going to have the kind of institutional support that is going to make their lives easier. They are always going to be out there in the marketplace, whether the research marketplace or the training marketplace.

I think that we want to see a situation where the States do invest their institutional resources at least in the State universities in this area. At least I for one see research as a very important strategy. Plus the fact, I think—and I don't know whether my colleagues would agree with me—that there is much room for research to come up with creative solutions to the kinds of problems being faced by the American workers.

Steve has talked a little bit about the problem of, say, an emerging industry in dealing with toxic and hazardous waste. That emerging industry has some problems which cannot be solved by just moving technology that has been developed in other places to deal with those immediate problems. There is a real crying need for new ideas and new approaches. That is the road on which I see an increased emphasis being needed in the future.

Mr. GAYDOS. Does anybody else want to spread their philosophy on the record? We would like to get some ideas.

Mr. CORN. I would like to be candid about what I know are some of the criticisms of ERC's. Our biggest source of criticism is some of the labor organizations who don't feel they have sufficient access to us. That is explained by the restrictions of our funding. We are professional training oriented. Those monies are restricted to that. And we have not been able to do as much as we would like to do for the labor movement.

I felt frustrated that way at Hopkins. We have done a lot of, for want of a better term, pro bono work. We have done it, absorbed the costs by purloining other funds. Some way of opening up funds and extending our jurisdiction would permit us to meet that criticism better. But we haven't been able to respond as much as we would like to to the labor constituency in our region.

Of course, the private sector constituency is able to pay and is willing to pay at very respectable rates. Often the labor constituency can't. This is not the best of times for many of their organizations.

So, some loosening of the restrictions on funds we have or additional funds in the line of that New Directions money would help us to respond to that criticism, which we are aware of.

Now, they do it in California through the State money. That has been mentioned.

Mr. Spear. Yes; indeed, that was why the State money was made available, because the philosophy was that industry readily understood how to avail themselves of expertise in universities. They simply went in and bought it. But in general the labor movement, and particularly when you are talking about unorganized workers, simply did not have the wherewithal to access university expertise. Therefore, this justified the investment of State funds in setting up a unit whose explicit task was to make the university's expertise available to workers. And that's what we have.

Mr. Gaydos. Isn't it just plain old pragmatism that, if they want something, they've got to go to you? There is no other place to go. Where would they go?

Mr. Spear. In industrial hygiene and in medicine as well, there are a lot of private consultants out there.

Mr. Gaydos. There are?

Mr. Spear. A lot of private consultants, Mort is saying, and his students are going in that direction.

Mr. Gaydos. Is that where you go, you look in a book, consultant, look him up, and call him into your factory, and say, here——

Mr. Spear. Yes.

Mr. Gaydos [continuing]. Is that how you do it?

Mr. Spear. Yes.

Mr. Corn. There is a directory of consultants, yes.

Mr. Lee. Let me give you another example of worker training that we have been involved in. Actually, the Oil, Chemical and Atomic Workers Union has a somewhat unique clause in their bargaining agreement with the petroleum industry in that they have a clause that requires training of their key safety people, both from management side and also from the union side.

We recently put on a course for Conoco which was a result of this contract. To answer your question some time ago about how we did it, it was a contract that the ERC entered into with Conoco to put on the course. We sent faculty into the refineries specifically of Conoco, took a lot of slides, familiarized ourselves with the specific process that was unique to Conoco as well as the petroleum industry, and put on a course that involved a collaborative effort, really, between us and the company technical people to try to get them trained as sort of a side benefit of this kind of a training course. It was very effective.

It was a sit-down classroom kind of setting, but it was a very effective, in our minds, way of reaching the workers who were responsible for health and safety of their employees.

I would like, before I leave, though, and give up the mike, to answer your question directly about whether or not you think we are on the right track. I think the answer to that is yes, from my perspective. I definitely think, as we have stated before, that we feel that the ERC Program has been a great success. I think the major word that would describe our feelings is one of frustration right now in terms of seeing how large a need there really is out there and having a very limited amount of resources to be able to address that need.

We think that a lot of disease and injury can be prevented. We think that our efforts directly address that and can make a significant impact. We are just beginning to touch the surface.

Mr. GAYDOS. Should we have a degree program set up where you get a degree? You give an M.D. to somebody? We do have that after a fashion, don't we?

I don't know if it was you, Mr. Levine, that suggested that we get a master of science degree.

Mr. LEVINE. Yes; our students can get a master's of science, master's of public health, a doctor of public health, or a doctor of philosophy.

Mr. LEE. All of our programs are degree programs. They all end up and terminate with a degree of some sort.

Mr. GAYDOS. We've had a room set aside in a factory, whether it's in Conoco, what have you, Gulf. And they set a room up. And they've got slides. And they put all these things on. You know, you go through the motions. I don't know if that is the answer to what we are talking about here. They give you a nice little slide. They tell you, you know, show a guy working, pick up but be careful, check the safety data sheets, check if you don't know what you're working with.

Is that what we are looking for? Are we looking for something that is more than that? That is a mechanical aspect.

Mr. SPEAR. Let me respond to that. I had a discussion with the medical director of the Ford Motor Co. about 2 weeks ago on exactly this subject. He pointed out that the ability to recognize the hazard of the work is essential. You have got to be able to know that what you are doing is hazardous or what it is about your job that is hazardous. But that's not enough. Just informing workers of the hazards or indeed informing professionals of whatever variety of hazards is not enough. In some cases more creative solutions are also required to get people to modify their behavior and to do things that they would not normally do, or to avoid the kind of hazardous behavior that leads to accidents in the workplace.

Mort can probably give you some direct examples of this from the area of safety. In any case, it is clear that putting up posters, giving information is not adequate; but it is essential. It is the first step.

The second step, particularly in the area of safety, where behavior is a very large component of it, is to do research in methods of behavior modification. How do you induce people to do things that they find annoying to have to do? And that is certainly an important area of research that has not been fully developed.

Mr. GAYDOS. You gentlemen have thrown a lot of light on the subject.

You give us an awful lot of areas of thought-provoking situations and continual confusion on the subject matter. I guess they are both related. You are never going to separate the two between you know, training and actual research and a combination of those.

We had so much difficulty. I am not complaining, maybe just as a matter of illustration to professionals. We had so much difficulty when we considered the act in its essence from the beginning, among our colleagues to explain, you know, the concept of what we are trying to do with the OSH Act. They kept saying: "Gee, you have all kinds of things, why should you pick up another burden"? The company is not going to overlook those things. They have safety committees, because it's valuable to them to make sure that their workers are safe because of lost time, accidents, higher insurance rates. You guys are in a field where you shouldn't be, you know.

It's just ironic that every major industrialized nation in the world is like 30, 40 or 50 years in front of us. In West Germany they have had an OSH Act for 40 years. You know, West Germany is pretty highly productive, used to be anyhow, before this recent change in international trade. But that's a problem we had. We are still groping around, trying to find a solution to get behind as to what we should be doing.

I tell you, when the term industrial hygienists first came up, believe me, we passed the act, nobody knew what it was. Someone brought the word up, they said: where do you find them? What kind of degree do they have? Where do they come from? How much do you pay them? And how many do we have, industrial hygienist? Ten or 15 years ago, that was a fact. I never knew of any industrial hygienists. You fellows are in the profession.

Those are some of the practical problems we had.

I want you to know that, even though all the members aren't here, the material that you put together, especially the enlightening material as to the practicality, how you are running your programs and how you are funding them and what you intend to do and your feelings and your philosophy and your thoughts, all that is very, very important. It is not necessarily that just this committee is going to study it. Other people come and they ask us. We have the record printed. When a record is hot, so to speak, we just can't fill the requests; I can tell you that. Like, we have these video terminals, whether or not a video terminal is dangerous or not, like a microwave oven. We had so many conflicting opinions from professionals, some saying there's no such thing as emission of any type of electronic byproducts or what have you. Another one says, oh yes, there is.

Those are some of the problems. And we are laymen here on the committee, trying to legislate and trying to take action in a very highly technical field at times.

The OSH Act was put together and had its beginning in that type of an atmosphere.

I want you to know that what you say is important. I don't care how many people are here. It does find its way into a lot of different places. It is studied. It is considered. You are absolutely invaluable to the committee because we just don't have the knowledge or the ability many times to even analyze as you people do. You are part of the legislation, whether you like it or not. After it's out, you are part of it.

If you have been very persuasive, probably 90 percent of it reflects your thinking. If you haven't been, then maybe some other guy's thinking finds its way into the legislation.

I want you to know we really appreciate you coming here at your own expense. I hope that it has been as enjoyable to you as it has been to me.

Does anybody else want to put anything else on the record?

All of the submitted statements will be made part of the official record in this matter. Without objection, it is so ordered.

Mr. **Gaydos**. The committee will stand adjourned until the call of the Chair.

[Whereupon, at 11:30 a.m., the subcommittee was adjourned, subject to the call of the Chair.]

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APPENDIX

PREPARED STATEMENT OF VERNON E. ROSE, PH.D., DIRECTOR, DEEP SOUTH CENTER FOR OCCUPATIONAL HEALTH AND SAFETY

Mr. Chairman and members of the committee, I very much appreciate the opportunity and privilege to submit information to you on the programs and activities of the Educational Resource Centers (ERCs) which have been developed through the efforts of the National Institute for Occupational Safety and Health (NIOSH). It is also my pleasure to present specific information on the activities of the Deep South Educational Resource Center for Occupational Health and Safety.

The Deep South ERC is one of the newest programs having been designated as a NIOSH Center in June, 1983. We are thus just beginning our third year as a full member of the ERC family. Our Center offers educational programs in industrial hygiene through the School of Public Health, University of Alabama at Birmingham (UAB); Occupational Health Nursing through the School of Nursing also at UAB; and, Occupational Safety and Ergonomics, through the Department of Industrial Engineering, School of Engineering at Auburn University.

I am sure that all of the ERC directors will note that one of the most rewarding aspects of the program is the opportunity to form interdisciplinary relationships with other schools in our universities or other universities in our state or region. For our program and for me personally this certainly is the case. At UAB we have had a long history in the health sciences center of crossing school lines to work on research projects and have developed major disease treatment and service centers. These include efforts in cancer, diabetes, arthritis, and spinal cord injury to name just a few. Consequently, when the first design of the Deep South ERC was developed, the potential for interactions within the UAB Health Sciences Center were quite apparent. However, in that our University did not have an educational program in occupational safety in our School of Engineering, we looked with interest at the established program in safety and ergonomics at Auburn University which is 120 miles southeast of Birmingham in Auburn, Alabama.

As many of you know, in our state like other states, the traditional rivalries between universities is often found not only on the athletic field, but also in academic areas. Prior to our involvement with the ERC program, there had not been any extensive interaction between the educational programs between these two universities. However, since the successful development of our relationship through the ERC, other interactions have grown between Auburn and UAB. For example, one of the researchers in our Department of Environmental Health Sciences in the School of Public, has developed a diagnostic test for the virus which causes blue tongue disease in cattle. She is now working with researchers in the Veterinary School at Auburn University (as well as with Oxford University) to develop a vaccine for this very serious agricultural problem. Other linkages between UAB and Auburn have also been developed in the genetic engineering and animal husbandry and agricultural areas. I think it important to note that one of the earliest linkages between these two fine universities was fostered by NIOSH's Educational Resource Center program.

I firmly believe that while our individual educational programs may have developed without the funding received from the NIOSH ERC program (obviously at a slower rate) it is very doubtful that the interdisciplinary activities would have taken place. The concept of an interdisciplinary approach was, from the beginning, the heart of the NIOSH program. In 1976 and 1977 when the ERC concept was being developed, I was a senior official at NIOSH. While not directly involved in the ERC program, I did have the opportunity to observe its birth including the development of the basic philosophy. The central focus of the program was that occupational health and safety problems require, in almost all instances, a multidisciplinary approach to not only solve problems, but more importantly to prevent them from happening. If the physician and nurse identify a problem through health examinations, and the industrial hygienist collects the information from the work environment to document the causal relationship, it is often the engineer who must implement the controls and hopefully be involved in future designs to eliminate the potential for reoccurance of the problem.

The NIOSH philosophy was simple. The best way to assure a team approach to problem solving, was to develop interdisciplinary educational programs for the students before they become professionals. This same philospphy was applied to continuing education programs for practicing professionals. It is my opinion, based on my interactions with the other 13 ERC Directors, and as a professional health and safety practioner for more than 20 years, that this concept is having an impact on the practice of our professions.

At the Deep South ERC, as is other ERC programs, we have courses in which students in engineering, nursing, industrial hygiene and occupational medicine learn together. One of our most successful interdisciplinary courses has been one which involves fieldtrips to different workplaces in Alabama and Georgia. These fieldtrips, which involve students in all of the disciplines, allows us to show our students real problems and how practicing professionals deal with them.

While our individual educational programs might survive without the NIOSH ERC support, I am less sure that these opportunities to provide for the interdisciplinary learning would fare as well. Almost one-third of the federal funds we receive are spent on student stipends, tuition, and fees, and we estimate that for every federal dollar spent on the Deep South ERC, more than one dollar in state and private funds were also made available. Our student support funds are critical in that they allow the aspiring occupational safety and health professional to attend school on a full-time basis. Therefore, we are able to provide a curriculum which includes not only the basic material which needs to be covered for the individual professional field, but also to go beyond this information and develop courses which provide interdisciplinary opportunities.

Without federal support many, if not most, of our students would become part-time students and therefore would need to stretch their education out over a long period of time. Actually students receiving NIOSH support must undertake full-time study and seek to complete their degree as soon as practical. If more of our students were going to School on a part-time basis, we would feel the pressure to reduce their coursework to the bare minimum. Under these circumstances the opportunity for interdisciplinary educational activities would be severely curtailed and I think ultimately this would lessen our hope of solving some of the more complex occupational safety and health problems now and in the future.

In addition to the interdisciplinary activities, another bright spot of the ERC program has been the development of our research capabilities. In almost all the ERC programs, students at the masters as well as the doctoral level are involved in research of field projects. These efforts often produce results which can be directly applied to existing work situations, or which can form the basis for future research efforts.

One of the other major activities we have been able to undertake because of the ERC funds, has been the very successful program in continuing education and "outreach" to other universities, as well as to professional and other groups. In the continuing education area, we have accomplished a lot in just several years. During this past year, the Deep South ERC has sponsored 16 short courses which have impacted more than 600 individuals mostly from Alabama, Florida, Georgia, Tennessee, and Mississippi.

Our programs provide the only opportunity for many individuals to further their knowledge about occupational safety and health. The typical industrial operation in the Deep South is more and more becoming a small to medium size plant with less than 1,000 workers. The plants are usually subsidiaries of larger corporations with headquarters in the Northern or Eastern United States. Most of the industrial hygiene/occupational medicine activities in these companies are located at corporate headquarters, and the occupational safety and health "team" at the plant usually involves one or two full-time nurses, a part-time local physician who has been retained to provide medical examinations and probably has little or no training in occupational medicine, and possibly an engineer or technician on the staff who has the responsibility to conduct measurements of the work environment. Usually the personnel officer administers the local occupational safety and health program.

Usually, none of these individuals have had any formal training in occupational safety and health and in most cases their company is reluctant to send them to short courses which involve not only significant expense in travel and tuition, but also leave the workplace uncovered by their professional talent during the time they are away. Consequently, our approach has been to develop a continuing education program which includes short courses of one to two days, often including part of the weekend, and to use ERC resources to make the tuition reasonable.

We have focused our initial continuing education efforts on occupational health nursing and safety. We have been successful in intiating our continuing education programs and now look to expand. NIOSH has recognized that one of the continuing education needs in our part of the country is to impact the family practice or other private physician who may see workers as patients or who may work part-time for a company in providing pre-placement or periodic medical examinations. We are now developing plans with the family medicine group at our School of Medicine to develop a continuing education program to impart concepts of occupational health and safety into this area of medicine.

It is very unlikely that these efforts would take hold quickly and develop without the financial support available from the Educational Resource Center program. It is a simple fact of life that faculty promotion and growth are not significantly enhanced by involvement in continuing education programs. Without the NIOSH mandate for the inclusion of these efforts in the ERC programs, I fear very little would be done. We would then lose a major opportunity to impact those who are currently working on occupational injury and illness problems.

In the area of outreach, we have been very successful in working with the professional associations concerned with occupational health nursing, occupational medicine, industrial hygiene, and occupational safety. Our goal has been to help these groups develop better professional education programs for their members. We see this as an area which will allow the limited number of practicing occupational health and safety professionals in our part of the country to further develop their skills in addressing workplace safety and health problems.

One of our most notable outreach activities is to assist other schools and universities in their efforts to present lectures and courses in occupational health and safety. Our occupational health nursing faculty are developing an inventory of experts whose services can be made available to the other 120 schools of nursing in the Deep South. The occupational safety and ergonomics faculty at Auburn University have provided education material to other schools of engineering, and are developing plans to institute an occupational safety and health course at the School of Engineering at Tuskegee Institute. It is obvious that there efforts, which are designed to impact the educational curricula at other schools, require patience, dedication, and recognition that everything cannot be done at once. Unfortunately, without the Educational Resource Center program the concept of outreach could not be of a high priority within the individual programs.

In conclusion, I wish to again thank the Committee and its Chairman for the opportunity to provide these comments. Hopefully they contribute to a better understanding of the ERC program and what we have accomplished because of its existence. We have a commitment to developing good educational programs, not only for our full-time students but for the practicing professional as well as the students at other educational institutions.

However, we are working in an area which traditionally has not been well known certainly in academia. Consequently it is an uphill battle to gain the attention and support of those who control the destinies of academic institutions. This is why federal support, through the ERC program, is so important. As a taxpayer, I certainly do not believe in a perpetual flow of federal dollars to this program. But these are areas and problems which have been neglected for many years and as an occupational health and safety professional I firmly believe that each ERC dollar yields a signficant benefit in terms of work-related disease and injury prevention and reduced social and individual cost.

Changes cannot be made overnight or even in a matter of years. There is still a lack of well trained safety and health professionals to deal with the problems in the workplace. Also, many of those responsible for dealing with the problems have little or no training in this area. We and the ERC program are committed to working with NIOSH, the Centers for Disease Control, and other agencies in attempting to address these problems. When we consider that we are dealing with one of the most important resources of our country, the health and well-being of the American worker, it would seem apparent that the ERC program is a good investment.

Prepared Statement of Richard R. Monson, M.D., Sc.D., Director, Harvard Educational Resource Center, Harvard School of Public Health

Environmental health and, specifically, occupational health have been major concerns at Harvard since 1913. As early as 1918 Harvard was providing training in industrial hygiene for factory physicians from throughout New England. Dr. Alice Hamilton, Harvard's first woman professor, was a pioneer in industrial toxicology and one of the School of Public Health's initial faculty members. Largely through her investigation of worker poisoning in the Illinois lead industry that state became the first in the country to adopt legislation aimed at safeguarding workers' health. She and Professor Philip Drinker, Dr. Louis A. Shaw, and Dr. Leslie Silversman, other distinguished colleagues at Harvard, pioneered in documenting the toxic effects of common industrial substances, especially metallic substances; in exploring the mechanisms by which the skin and lungs withstand environmental insults; in determing safe concentrations of dust and smoke; in investigating radium poisoning in the United States; and in designing control systems, gas masks, and other protective technology.

Under the leadership of Drs. James L. Whittenberger, John M. Peters, and David H. Wegman, continuation of the historic interest in the relation between occupational exposures and occupational disease has been reflected by a series of more recent research efforts aimed at identifying new hazards and bringing them under control. These have included studies of toluene di-isocyanate (TDI) and lead toxicity; evaluations of health hazards involved in firefighting and rubber tire manufacture; respiratory disease in ganite cutting, talc mining, and meat wrappers employed in the retail food industry; and mortality in a number of different types of manufacturing concerns in Massachusetts. Morbidity or mortality studies determined whether excess disease was seen when compared to less exposed populations. Industrial hygiene evaluations characterized exposure to specific chemical substances and were used in the development of recommendations for controlling identified hazards.

The School played a signal role in recent years as a nonpartisan participant in environmental research of vital concern to differing societal groups: industry, government, consumers, and workers. A pioneering agreement signed in 1971 with the United Rubber Workers and the B.F. Goodrich Company paved the way for similar three-way agreements with labor and management at the School and elsewhere. After careful negotiation, the Company and the Union agreed to make company resources available and the University agreed to conduct research on occupational health, industrial hygience, and occupational epidemiology. Over the past years rubber workers, the Union, the Company, the University, and society have benefitted from the agreement. Work areas with potential health hazards have been detected, improved industrial hygiene has been instituted, and research methodology has been refined. In 1985, a similar agreement was signed between the United Automobile Workers, General Motors, the Harvard School of Public Health, and the University of Massachusetts Medical School. A five-year study will be conducted to assess the potential health effects of working with cutting oils.

Teaching efforts were significantly strengthened by a grant award from NIOSH in 1977 establishing an Occupational Safety and Health Educational Resource Center (ERC) at Harvard. The grant enabled the University to increase the quality and size of the teaching faculty and staff, expand the student population in this field, revise existing and initiate new training programs in specific disciplinary areas, revamp the curriculum, equip training laboratories, and offer students an interdisciplinary training experience in occupational safety and health problem solving. Since that time significant numbers of physicians, nurses, industrial hygienists, safety specialists, epidemiolgists, biostaticians, as well as lawyers, economists, political scientists, and other have been instructed in this field. These individuals have been trained to work in interdisciplinary teams to recognize and prevent occupational impairments, disease, and injuries through the control or elimination of harmful occupational exposures.

In addition to research and teaching activities, public assistance has been provided throughout the region by contributions of the faculty, staff, and students. Examples of activities in this area include serving as guest lecturers, providing curriculum assistance, offering mid-career professional education, hosting domestic and international visitors and acting as a referral/information service on occupational safety and health issues and resources. Another service activity has been conducting health hazard evaluations in workplaces for NIOSH.

In addition to grant support such as that which the Harvard School of Public Health has received from NIOSH since 1977 for the ERC, support from the administration of the School in concrete terms has been essential for maintaining the training programs which have been strengthened and/or established. In a time of serious space constraints in our School, the Administration has continued a major commitment on space to the Center. Recently the School made a commitment to a newly tenured faculty position in occupational health. In addition to this new position, the School has sought private foundation funds to support junior faculty in developing research. A specific grant from the Mellon Foundation has been designated to provide half-time research support to junior faculty.

Current research in the Program spans a wide variety of occupational health problems. The goal is to identify and contribute to reducing or eliminating job-related health hazards. Physiologic and epidemiologic studies address problems of neurobehavioral toxicity, respiratory disease, and cancer, as well as occupational disease surveillance and policy analysis. Another major area includes measuring and evaluating occupational exposures, designing control systems and respirators, as well as the study of designing the demands of jobs to match the capabilities of workers. There is also interest in integrating preventive services into the medical care delivery system. Current investigations draw upon the expertise of toxicologists, radiologists, respiratory physiologists, engineers chemists, physicists, and other occupational health specialists, as well as epidemiologists and biostatisticians.

The program offers interdisciplinary graduate degree programs in occupational medicine, industrial hygiene, and an allied core for other disciplines which collaborate in solving occupational health and safety problems. In addition, mid-career training for professionals, paraprofessionals, and technicians is offered through continuing education programs for physicians, industrial hygienists, safety specialists, nurses, and others. The educational programs target the New England states, but attract candidates for training from all areas of the country. The aim of the teaching is to produce persons trained in occupational safety and health who can recognize and prevent occupational injuries and disease. Prevention is the primary orientation of professionals receiving this training at Harvard. This objective is being accomplished by directing the training effort at the development of public health perspectives, the acquisition of skills and knowledge for prevention, and the creation of a sensitivity about the political climate in which professionals must act. Harvard graduates are serving in many realms, including academia, industry, all levels of government, occupational health clinics, and labor unions.

The residency in occupational medicine is comprised of training in the public health disciplines relevant to the prevention and control of occupational disease and injury. Upon completion of this residency program, physicians are eligible for certification by the American Board of Preventive Medicine (Occupational Medicine). The two-year program includes didactic sessions in epidemiology, biostatistics, industrial hygiene, and health policy, and the practical application of skills to problem solving and research. Field experience includes participation in health hazard evaluations, clinical rotations in which individual patients are evaluated, and the design, execution, and analysis of data for a short-term research project. Residents are placed in occupational health programs in industry, government, or labor unions during the practicum. The residency leads to conferring of the Master of Occupational Health and Master of Science degrees. Applicants must have had one year of clinical training; certification by the American Board of Internal Medicine is recommended.

The two-year Master's program in industrial hygiene and occuptational safety is designed to help meet the demand for professional personnel with the skills and scientific knowledge needed to identify and control health problems that exist in the workplace. The core curriculum includes recommended and required courses dealing with basis problems in occupational health and industrial environments, environmental control, safety science, identification and measurement of air contaminants, air and gas cleaning, principles of toxicology, biomechanics and work physiology, and aerosol technology.

Students specializing in industrial hygiene normally undertake internships and research projects dealing with toxic substances, noise, radiation, and heat stress. Those specializing in occupational safety normally undertake internships and projects dealing with physical hazards or work methods that cause traumatic or cumulative injury. Students graduating with an emphasis in either area will obtain the skills required to handle the broad range of environmental hazards which exist in the workplace.

Prior to the establishment of the Harvard Educational Resource Center, our occupational medicine and industrial hygiene training programs graduated 3-5 persons per year. The ERC funding provided a solid base to increase these programs and to expand our training offerings. Since 1978 we have graduated 76 occupational physicians, 79 industrial hygienists, eight occupational health nurses, and 29 persons with interdisciplinary training in occupational health (epidemiologists, lawyers, economists). In September 1985 we will have the following numbers of students enrolled: occupational medicine—16; industrial hygiene—12; occupational health nursing—6; and interdisciplinary—6.

The ERC grant at Harvard has provided a stable source of support for students and faculty. The graduates of the program contribute to the growing pool of concerned public health professionals whose primary task is to prevent occupational disease and injury. The continuation of the ERC program is essential to continue this major force in the American workplace.

PREPARED STATEMENT OF BERTRAM W. CARNOW, M.D., DIRECTOR, GREAT LAKES CENTER FOR OCCUPATIONAL SAFETY AND HEALTH, UNIVERSITY OF ILLINOIS

Mr. Chairman and members of the committee, I deeply appreciate the opportunity to testify before you today to bring to your attention the activities and the dimensions of the Educational Resource Center at the University of Illinois in the Colleges of Medicine, Engineering, Nursing and the School of Public Health.

Programs in Occupational and Environmental Health and Safety had their beginnings at the University of Illinois in 1972 with the formation of the University's School of Public Health. A department of Occupational Environmental Medicine was formed over the next five years, grew to one of the large departments in the School, and each year provided courses in occupational health and safety to those nurses, industrial hygienists and physicians wishing to acquire knowledge in this field. Eventually, graduate degrees were offered in industrial hygiene and nursing but limited funding did not permit any further expansion of the program.

The funding by NIOSH of the ERC provided the means for developing a strong regional center which has grown remarkably over the past eight years, and has provided a wide range of services to Illinois and surrounding states, a region with a major concentration of heavy industries. To point up the importance to the region of the development of the Great Lakes Center, I should like to note some of its activities.

THE PROGRAMS IN MEDICINE

One year before the ERC came into being, funds from the Kellogg Foundation were used to develop a residency jointly between the University of Illinois and a large County Hospital. The ERC made it possible to set up in addition, a residency in Occupational Medicine at the College of Medicine of the University. This residency, which came into being as a result of ERC support, has turned out highly trained physicians skilled in Occupational and Environmental Medicine, and board certified in this discipline. They are currently serving with the Federal Government, in NIOSH, and other agencies and industry including IBM, General Motors, Argonne National Laboratory, and academic institutions around the country.

The program in medicine at the University also provides occupational medicine services to the University Hospital, and to the State of Illinois through its medical clinics, and provides a forum for disseminating knowledge regarding Occupational Health and Safety through Occupational Medicine Rounds, weekly seminars and lectures to physicians and medical students. The faculty provides educational services throughout the state, for example, a series of lectures in Occupational Medicine to family practitioners was carried out last year in many of the smaller cities throughout the state. Faculty members also provide an Annual Review Course in Preventive Medicine and Occupational Medicine cosponsored by the American College of Preventive Medicine for physicians nationally who wish to stand for certifying examinations in occupational medicine.

There is also a large Reference Center available to the entire region with skilled professionals in charge to answer questions, and provide assistance to scientists, industry representatives, unions and others. It has also provided courses for OSHA for the training of federal employees, for example, a week long course for GSA employees regarding handling of hazardous materials, and OSHA training courses for federal employees of that agency. All of this activity was made possible through ERC funding, and a fully developed program exists whereas a decade ago, there was a void.

NURSING

A program in occupational health in nursing, leading to a Masters degree was developed in the College of Nursing as part of the Center's development. Nurses at the

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Masters level have graduated from this program, and assumed important roles in industry and academia. This program provides instruction nationally through an annual course each year in occupational health and nursing which is attended by hundreds of nurses from industry.

INDUSTRIAL HYGIENE

Industrial hygiene programs in the School of Public Health have turned out dozens of highly skilled hygienists, some of whom are currently heading up programs for the federal government and with many others assuming responsible positions in major industries.

A program in Safety which began in the School of Public Health has now expanded, and is currently based in the College of Engineering at the university. This program in Occupational Safety is the first in this college, and was developed as a direct result of the ERC's presence and activities at the University. It is currently a fully developed program in safety engineering and will graduate its first safety engineers this year.

All these programs, which either existed to a small degree or not at all, have flourished with ERC support. The major benefit of the presence of these programs is that they permit and encourage multi- and interdisciplinary activities. The complex problems of occupational and environmental health and safety demand such interactions, and this is an intergral part of the Center's programs. While research is encouraged and many studies have been carried out in all of the colleges, the emphasis in all of the programs has been on problem solving in industrial and governmental settings, and most of the trainees take their places in large industries throughout the country.

In conclusion, the Great Lakes Center for Occupational Safety and Health, and ERC which was brought into being through federal funding, has filled a void in an area where millions of individuals working in medium and heavy industries live.

The expertise provided by professionals working in and graduating from these programs has unquestionably had an impact on the health and safety of many through medical care, consultation, education, and the general heightening of awareness and consciousness of occupational health and safety among physicians, nurses, engineers and other professionals. Graduates of my program, for example Dr. James Melius, recently appointed Director of Division of Medical Surveillance of NIOSH; Dr. Murry Cohen, Director of a major safety program at NIOSH's Center in Morgantown; and those doctors serving at General Motors, IBM, and other large industries throughout the country; attest to the importance of the development of skilled professionals in ERC Centers. While support is provided by the state and the University, the ERC at the University of Illinois could not survive without the continued support of the Federal Government. The continued support of our Center and other Centers containing ERC's will guarantee a continued flow of expert professionals to service all sectors of our society now, and in the future.

PREPARED STATEMENT OF DON B. CHAFFIN, PH.D., DIRECTOR, CENTER FOR OCCUPATIONAL HEALTH AND SAFETY ENGINEERING, UNIVERSITY OF MICHIGAN, ANN ARBOR, MI

OVERVIEW

The University of Michigan was awarded ERC status and funding in 1982, recognizing our two decades of research and teaching in the field. Programs in place and supported at that time included Occupational Medicine (OM) and Industrial Hygiene (IH) both located in the School of Public Health and Occupational Safety Engineering (OSE) in the School of Engineering.

The primary organizational units composing the ERC include the Departments of Industrial and Operations Engineering (IOE) and Civil Engineering (CE), in the College of Engineering; the Department of Environmental and Industrial Health (EIH), in the School of Public Health; and the Department of Internal Medicine, in the School of Medicine.

The Director of the Educational Resource Center, Don B. Chaffin, Ph.D., is Professor of Industrial and Operations Engineering in the College of Engineering and Professor of Occupational Health in the School of Public Health, as well as Director of the Center for Ergonomics.

OCCUPATIONAL MEDICINE

The program has two main educational components. The first one is a non-residential MPH program in Occupational Medicine which requires the student to attend three days of class per month at the University for a two year period. The second component is a full-time occupational medicine residency which is also two years in length. The first year consists of clinics and courses. The second year is practicum experience in regional industries, clinical facilities, and other institutions such as the UAW, Michigan Cancer Foundation or at NIOSH. In addition to these programs, we offer a joint residency in family practice and occupational medicine with Wayne State University. The program in cooperation with the University Hospital has an active occupational medicine service. The basic concept of the program is primacy of prevention in solving occupational health problems. The major research interests of the Program are: occupational regional musculoskeletal disorders, neurotoxins, reproductive hazards, and occupational lung diseases. Dr. Lawrence Fine is the Program Director. There are 24 physicians currently enrolled in the Occupational Medicine Programs offered through the ERC.

INDUSTRIAL HYGIENE

The Industrial Hygiene Program at the University of Michigan is in the Department of Environmental and Industrial Health within the School of Public Health. There are four degrees to choose from: M.S., MPH, Dr.PH. and Ph.D. The program has a comprehensive industrial hygiene curriculum. Four major specialty areas are covered: comprehensive practice, ergonomics, chemical hazards/hazardous wastes, and engineering controls/ventilation engineering. The ergonomics program is nationally and internationally renown; the hazardous waste program is unique in the ERC system. The ventilation engineering program shows great promise.

Interdisciplinary interaction takes place in a number of ways including: course work; joint research; a combined seminar with safety and ergonomics students and a variety of field experiences. There are 29 full-time graduate students seeking degrees in industrial hygiene at this time.

OCCUPATIONAL SAFETY ENGINEERING

The Occupational Safety Engineering (OSE) Program is located in the Department of Industrial and Operations Engineering. The major focus of this program is ergonomics. Coursework and research activities emphasize the prevention of accidents and cumulative trauma injuries through ergonomics evalaution and design of facilities, equipment, tools, and work methods. Cognate courses are offered in management, statistics, information systems, and industrial hygiene.

The Masters of Science Degree in OSE can be completed in one calendar year (30-39 credit hours). The Ph.D. Degree emphasizes research, and typically requires an additional 2-3 years beyond the Masters Degree. The research emphasizes the methods and data necessary to control and reduce acute and chronic trauma to the musculoskeletal system, behavioral toxicology, and safety systems analysis.

The University of Michigan's Center for Ergonomics provides excellent laboratory facilities and a full-time staff of research scientists, engineers, and other support personnel to facilitate research activities. In addition, the proximity of Ann Arbor to the numerous manufacturing facilities in the Midwest provides ready access to many industries for cooperative in-plant research. There are currently 21 graduate students now seeking degrees in the Occupational Safety Engineering Program provided by the Michigan ERC.

CONTINUING EDUCATION AND OUTREACH

The Michigan ERC program lists a number of comprehensive and well attended courses including the following, many of which are unique in the Country: Introduction to Ergonomics/Advanced Concepts Workshop, Hazardous Waste Management, Cumulative Trauma Disorders of the Upper Extremities Symposium, Occupational Low Back Pain Conference, Management Briefing Seminar, Ergonomic Aspects of Manual Work, Industrial Hygiene Discussional, Selby Discussional, Introduction to Occupational Medicine for Family Practitioners, and Reproductive Hazards in the Workplace. Several recent new course offerings, "Microcomputer Applications in Industrial Hygiene and Safety" and a four month series of "Ergonomics in Occupational Health Nursing" courses have been exceptionally well received. Scheduled for Fall of 1985 is another new course offering: "Ergonomics Discussional". The courses offered this past year were attended by over 1500 practicing health and safety professionals and managers.

Outreach activities have increased in the past year. Over 200 papers have been written and presentations given to various organizations during the past year by the faculty. Also, the expansion of the Center library (e.g., training manuals and materials have been developed in the areas of ergonomics, cumulative trauma disorder, and manual lifting), and the assembly of videotaped training materials, and computer assisted education has occurred. One example of the latter is the development of two sophisticated microcomputer based programs for evaluating static strength requirements and metabolic energy expenditures in the workplace.

One of the major Continuing Education organizational projects has been the purchase of software for the compiling of mailing address programs. Currently, over 5,000 professionals from a wide range of disciplines have been cataloged. These programs will be continually up-dated, and will be used for program notifications and information distribution.

Prepared Statement of Robert O. Mulhausen, M.D., Director, Midwest Center for Occupational Health and Safety, Minneapolis, MN

The Midwest Center for Occupational Health and Safety was founded in 1976 to provide graduate training and continuing education for professionals, paraprofessionals and technicians in the field of occupational health and safety. The Center was established as a consortium organized to coordinate similar activities in academic institutions, to develop an interdisciplinary approach to the education of occupational health professionals, and to foster interrelationships among various educators and practitioners dedicated to the growth of knowledge in the discipline of occupational health and safety. The Center's major goal is to decrease the incidence of occupational illness and injury in the microenvironment of the workplace with particular emphasis on prevention. The consortium consists of the following institutions:

School of Public Health, University of Minnesota, Minneapolis;

Department of Industrial and Technical Studies, University of Minnesota, Duluth;

Department of Internal Medicine and Office of Continuing Education, St. Paul-Ramsey Medical Center, St. Paul.

The Center, which serves the upper midwest and plains region of the United States, is administered through the School of Public Health at the University of Minnesota Minneapolis with partial funding for the National Institute for Occupational Safety and Health (NIOSH).

The Center offers graduate training at the following levels:

Master's and doctorate in industrial hygiene and bio-hazards control (School of Public Health, University of Minnesota);

Master's level in occupational health nursing (School of Public Health, University of Minnesota);

Master's in industrial safety (University of Minnesota, Duluth);

Residency programs in occupational medicine (St. Paul-Ramsey Medical Center);

Included in the latter programs (for physicians) is an academic year with the School of Public Health, University of Minnesota leading to a Master of Public Health (M.P.H.) degree.

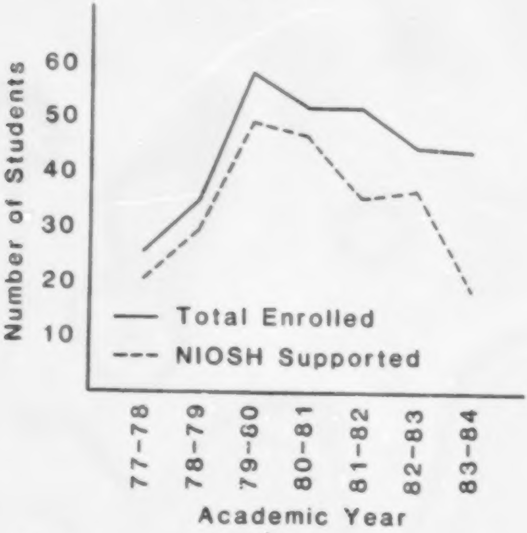
The Annual Graduate Occupational Health and Safety Institute offers a unique opportunity for students to earn graduate credit over a two-week period. It is designed as an intensive, interdisciplinary course of study for professionals currently or soon-to-be practicing in the field of occupational health and safety.

The Continuing Education Program offers a mechanism for practicing professionals to stay abreast of the latest issues and concerns in occupational health and safety. Courses are approved for continuing education credit appropriate to each discipline.

The occupational health professionals trained by the Center may be employed by corporations, large industries, insurance companies, governmental agencies, private industrial health clinics or private consulting firms. Depending on the size and type of acitivities, one or more of these professionals may be employed. The occupational physician is a clinical expert with skills in occupational medicine and program administration. The occupational health nurse is a generalist and functions as a program developer and manager. The industrial hygienist serves to identify, evaluate and control hazardous agents in the workplace. The safety specialist acts to prevent and control injuries and to implement loss control programs. The reduction of injuries and prevention of illness in the workplace can be accomplished most effectively when these professionals function as a team.

EDUCATION AND TRAINING

Since the Center was initially funded, a total of 249 fulltime students have enrolled in the academic programs. This number includes 11 in Occupational Medicine, 16 in Occupational Health Nursing, 94 in Occupational Hygiene, and 128 in Industrial Safety. Of these, 168 received financial support from the Center grant in the form of full or partial traineeships. In addition to the full-time students, a number of part-time students have been enrolled in Center programs and some of these also received partial traineeship support.



Number of Full-time Students Enrolled in Academic Programs

The initial efforts in continuing education involved contracts with industry, government, and professional associations to discuss the Center grant, to identify their educational needs, and to generally plan how the Center could be a more effective resource to those having responsibility for occupational health. During the first two and one-half years, continuing education was delivered to approximately 1,094 persons. Most of the activities were developed independently within each core program and were offered in Minnesota.

The Center reorganized its continuing education activities in January, 1980 to coordinate the course offered by each core program, to develop courses of a more interdisciplinary nature and to provide a mechanism for expanding its efforts throughout Region VII.

The achievements of the Center's continuing education efforts since the reorganization have been particularly gratifying. From September, 1980 through June 30, 1984, 131 courses were presented either directly or through co-sponsorship. The enrollment over this period of four years totaled 6,695. The breakdown of participation is as follows:

Primary Care Physicians	673
Occupational Medicine Physicians	223
Nurses	1,317
Industrial Hygienists	415
Safety Professionals/Specialists	1,237
Management Representatives	1,703
Labor	48

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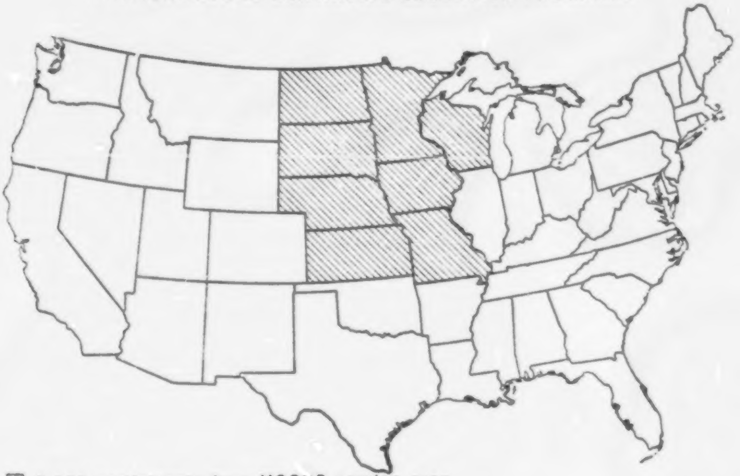
Others	1,079
Total	6,695

PARTICIPANTS IN CONTINUING EDUCATION PROGRAMS



▨ 6,141 participants from MCOHS service area

☐ 554 participants from 39 other states, Wash., D.C. and foreign countries

As noted on the map, most of the participants who attended these courses are from the upper Midwest and Plains States.

Examples of multidisciplinary topics are:

Agricultural Respiratory Hazards;
Professional Leadership in Agricultural Health and Safety;
Comprehensive Industrial Hygiene Review;
Occupational Respiratory Protection;
Occupational Health Nursing-Basic Theory and Update;
Recognition of Accident Potential in the Workplace Due to Human Factors;
Sampling and Evaluating Airborne Dust;
Occupational and Environmental Pulmonary Diseases;
Occupational Medicine Updates;
Workers' Compensation: A Management Approach to Working Within the System;
Medical/Legal Management of Workplace Health Concerns;
Chemical Abuse in the Workplace;
Workers' Right-to-Know;
Pulmonary Function Testing;
Industrial Hygiene Sampling Strategies;
Noise and Occupational Hearing Loss;
Human Behavior and Communication in the Workplace.

Many of the programs listed can be conducted for specific groups (e.g., private companies, governmental agencies, colleges and universities, professional societies, and any other interested group). The costs of these programs are negotiable, and depend upon course content and length.

Overall, since the inception of the Center, a total of 7,789 persons have received some form of continuing education through our efforts.

RESEARCH

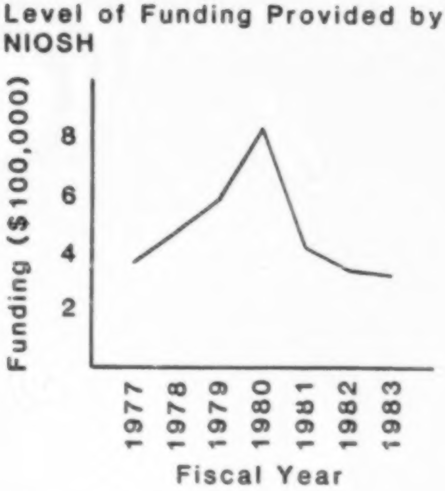
Research activities are being carried out within each core academic areas in addition to some multidisciplinary projects. Some of the areas that have been or are currently being investigated include:
The effect of lead on the immune response to mice;
A study of the occupational risk of taconite workers in Northern Minnesota;
The use of a laser particle-size analyzer for an empirical calibration of silica dust;
The behavior of wood dust aerosols;
Respiratory symptomatology and pulmonary function in welders of mild steel;
Wrist injuries among workers performing tasks involving repetitive wrist motions;
Potential health risks among grain elevator inspectors;
The risk of grain handlers due to exposure to grain treated with carbon tetrachloride;
The health risk to turkey farmers due to exposure to aspergillus;
Occupational health effects of low BTU coal gasification;
Low back pain and trunk strength;
Employee back injuries in a university setting; and
The determinants of the functions and roles of Master's prepared occupational health nurses.

OUTREACH

Outreach efforts by the Center faculty have included a wide variety of activities such as the following: presentations to Minnesota Area Vocational-Technical Institute directors and administrative staffs relative to safety responsibilities within their school and to safety and teacher liability; an annual two-hour seminar on occupational medicine to Phase B medical students at the University of Minnesota; technical assistance to OSHA "New Directions" program in Industrial Relations and Agricultural Extension Service at the University of Minnesota; and consultation and lectures on industrial hygiene, safety, and occupational health nursing to a variety of state and community colleges throughout the area. In addition, presentations have been given at a variety of professional associations, voluntary organizations, safety councils, and other formal and informal meetings.

RESOURCES

The primary financial support for the Center's faculty and facilities is provided by the institutions comprising the consortium. The outside funding from NIOSH made it possible to organize the Center, to develop and implement the various programs, and to provide financial assistance to students. Nearly one-half of the funds received from NIOSH have been obligated to student support in the form of traineeships to cover stipends, tuition, and fees. While the various institutions have become increasingly involved in the Center's efforts, the decline in NIOSH funding has had an impact on the full-time student enrollment, especially for multi-year programs. In the past several years, many of the students have received only partial support or have elected to enroll on a part-time basis.


Level of Funding Provided by NIOSH

Much has been achieved by the Midwest Center with strong support of the consortium institutions and with the important funding by the National Institutes for Occupational Safety and Health. But opportunities and challenges remain. The Center will continue to develop and to expand its educational programs for dedicated professionals in the field. Of increasing importance, however, is the need to stimulate, to perform, and to disseminate excellent research devoted to understanding the various influences in the workplace environment has upon human illness and disease. Pinpointing these influences and adapting preventive techniques ultimately will control disorders related to the workplace. The midwest Center's base of exemplary education provides a significant foundation upon which to build strong, productive research programs.

THE MOUNT SINAI MEDICAL CENTER,
New York, NY, July 25, 1985.

Hon. JOSEPH M. GAYDOS,
Chairman Subcommittee on Health and Safety,
House of Representatives, Washington, DC.

DEAR MR. CHAIRMAN: the New York/New Jersey Educational Resource Center has been in existence since 1978. It is a multidisciplinary program supported by a consortium of four academic institutions in two states and consists of the following elements:

1. Training in occupational medicine at the undergraduate, graduate and postgraduate levels, based at the Mount Sinai Medical Center;
2. Graduate training in industrial hygiene at the Institute for Environmental Medicine of the New York University School of Medicine;
3. A master's program in occupational nursing at the Hunter College School of Nursing;
4. Baccalaureate and master's training in occupational hygiene at the Hunter College of Health Sciences;
5. Outreach and continuing education in occupational safety and health at the University of Medicine and Dentistry of New Jersey.

The overall administrative responsibility rests with the Department of Environmental and Occupational Medicine at Mount Sinai.

Occupational Medicine

The major activity in occupational medicine is a two year residency training program located at Mount Sinai. This program each year attracts two to five physicians of high quality, many of whom have already completed at least one year of training in internal medicine and a master's degree in public health prior to their arrival at Mount Sinai. The residency is styled as an apprenticeship rather than as a highly structured didactic program. Residents are, however, required in their first year to take formal course work in epidemiology, biostatistics, toxicology, industrial hygiene, health care administration, and occupational health. These courses are presented by committed senior faculty members from the Division of Environmental and Occupational Medicine as well as by faculty with relevant expertise from the other member programs of the consortium. Legal aspects of Occupational Medicine are addressed by lecturers with experience in workers' compensation, standard setting, enforcement, and toxic tort litigation, with special focus on the translation of laws and administrative policies into actual day-to-day practice.

The residents in occupational medicine participate, under faculty guidance, in the Mount Sinai Occupational Medicine Clinic, which provides services to patients from the New York-New Jersey area, as well as from more distant states. Each resident also spends several months of his/her two years as consultant (under supervision) to other services in the Medical Center on cases where an occupational or other environmental exposure may have contributed to a patient's illness.

The occupational medicine residents at Mount Sinai participate actively in field surveys of groups with toxic occupational exposures. In the recent past these surveys have included asbestos-exposed insulators, shipyard workers, school maintenance workers, employees exposed to mercury in a thermometer factory, ironworkers, PCB-exposed employess in capacitor manufacturing, and copper smelter workers. Occupational Medicine residents are involved in these surveys in study design, examination of patients, data analysis, report writing, and the presentation of findings to the scientific community. As their research skills mature, the residents are encouraged to develop research projects of their own under faculty supervision. To develop their practical skills in occupational medicine, residents are placed in unions, corporate medical departments, and government agency "field" sites, where they have the opportunity to apply the principles of occupational medicine in "hands-on" fashion and to become acquainted with the organization and administration of occupational health services.

There are at present eight residents in training at Mount Sinai five of them supported full-time by NIOSH training funds. In addition, each year several physicians, some of whom are employed in industries, spend 4-6 weeks in the program in "mini-residency" training, in order to develop and enhance their knowledge and skills in occupational medicine.

Former residents from Mount Siani now hold positions as occupational medicine experts in a wide spectrum of settings: in state agencies, corporate medical departments, and unions.

Occupational Health Nursing

This component of the Center is designed as an Occupational Health Nursing Track within the Master's curriculum in nursing at Hunter-Bellevue School of Nursing. The curriculum covers four semesters (56 credits) and has three major components: Core Courses (those necessary for all trainees to achieve the goals and purposes of the master's curriculum: 18 credits); Specialization courses (courses intended to provide an advanced body of nursing knowledge and skills: 18 credits) and Cognates (courses from nursing and related areas supportive of the core: 20 credits). The latter component includes courses in epidemiology, toxicology, biosttistics, and health and safety.

Many of the students are commuting students who are working full time in nursing and attending the university on a part-time basis.

The program has developed a list of 30 potential sites for student field placement. One of these, the New Jersey Department of Health, has accepted nursing students as interns for the first time in 1984.

INDUSTRIAL HYGIENE

Occupational Hygiene (NYU Medical Center)

Training takes place both at Sterling Forest and in Manhattan. Students are guided through two degree levels: M.S. and Ph.D. The masters program has practitioner orientation while the doctoral curriculum is designed to train individuals for academic and research careers. Mr. Morton Lippmann, a highly regarded and experienced research industrial hygienist, directs the program. There are two additional principal faculty and 22 support scientists all with advanced degrees (physics, physical chemistry, radiological health, biochemistry, etc.). The M.S. program is completed in 3–5 years. The M.S. curriculum contains traditional courses: toxicology, epidemiology, biostatistics, environmental hygiene measurements, and administrative management. There are no universal course requirements for the Ph.D. beyond those for the M.S. The specific program of study is established by consultation between the student and his or her academic and research advisor. Both programs have been very productive since the Center award in 1978.

Industrial Hygiene (Hunter College)

The second industrial hygiene program is located in the School of Health Sciences of Hunter College, City University of New York. It is a masters degree program which generally takes 18 months to complete. The program is only moderately structured; four courses (11 credits) are required, with the rest of the program selected from an array of professional courses (25).

The faculty consists of the Program Director, Dr. George Kupchik who is currently Professor Emeritus, and two part-time faculty in safety and hygiene.

The Outreach activities of the program include internship with OSHA, labor organizations in New York City (UAW, Textile Workers Union, etc.), as well as with industry.

CONTINUING EDUCATION—OUTREACH

Continuing education programs are coordinated by the College of Medicine and Dentistry of New Jersey—Office of Consumer Health Education. The program provides a diverse selection of courses designed for a varied audience: professionals and para-professionals, as well as technicians, labor, management, and safety and health committee members. Recruitment for participants has been achieved through several sources: open enrollment; contracting with corporations; and co-sponsoring with professional societies.

In addition to the Continuing Education (CE) courses, the program has responsibility for organizing the Annual Scientific Meeting of the entire ERC, which offers an opportunity for interdisciplinary exchange of information. The program also puts out a newsletter, "Outreach", which announces ERC-sponsored events and serves as an information clearinghouse.

Outreach activities of the Center include: convening a meeting of the 16 medical schools in the region to discuss developing training activities and curricula in the field of occupational safety and health; technical assistance to the University of Puerto Rico to determine the CE needs in occupational safety and health for Puerto Rico; and community health education activities that include informing high school students and minority college students about career opportunities in safety and health.

CONCLUDING COMMENTS

The overall mission of the New York/New Jersey ERC is to train health professionals in the scientific and practical disciplines which are necessary to reduce the burden of occupational injury and illness in this highly industrialized region of the United States.

While each of the programs in the ERC has its own particular responsibilities within the overall mission of educating and training health and safety professionals, all of the programs benefit from the ready availability of expertise in allied areas and from the opportunity for exposure to various aspects of the field provided by the ERC as a whole. Thus, the occupational medicine residents have had didactic training in Industrial Safety at Hunter's program in industrial hygiene; both industrial hygiene students and occupational health students have participated in field surveys conducted by the Environmental Sciences Laboratory at Mount Sinai and have attended occupational medicine clinic sessions there.

We thank you, Congressman Gaydos for having provided us this opportunity to describe the activities of our Center.

Sincerely yours,

Philip J. Landrigan, M.D., *Director.*

Prepared Statement of David A. Fraser, Sc.D., CIH, Director, North Carolina Educational Resource Center for Occupational Safety and Health, Department of Environmental Sciences and Engineering, the University of North Carolina, Chapel Hill, NC

Chairman Gaydos and members of the committee, I appreciate the opportunity to present this statement to the members of this committee and to describe some of the activities and accomplishments of the University of North Carolina Educational Resource Center.

In 1958, Professor Emil Chanlet of what was then the Department of Sanitary Engineering of our School of Public Health, attended a two week short course in Industrial Hygiene offered by the Division of Industrial Hygiene of the U.S. Public Health Service at their laboratories in Cincinnati, Ohio. With this course and considerable reading and self instruction, Professor Chanlet returned to Chapel Hill and offered a course on the subject to students in our School of Public Health. A year later he was awarded a modest grant from the PHS to purchase field equipment to support a laboratory section for this course. That effort has grown into what is now our NIOSH supported Educational Resource Center, which directly involves 35 of our full time faculty, over 50 special faculty for our short courses, has 85 students enrolled in graduate level education programs in five departments or academic disciplines related to occupational health, has produced over 400 graduates who are professionally active in the field, and has offered short term training to over 4200 students from 30 states who currently have some responsibility for occupational health in industry or governmental agencies, but have not had the opportunity to pursue a graduate degree in the field. In the last year alone, our specialized library in occupational health filled requests for over 1000 references, loaned out over 450 books and provided 700 audiovisual programs to industries, governmental agencies and interested parties in the southeastern United States. I mentioned this little historical vignette only to emphasize certain points:

1. Our program has been growing and maturing over a period of 25 years. It did not spring full blown into existence with the inception of the ERC program.
2. The remarkable pay-off that can be achieved by a truly modest support and encouragement of even a single dedicated faculty member.
3. The very significant contribution that has been made to the health and well being of the American worker by this collaborative effort between the governmental agency and the academic community.

Our Center was created in 1977 by consolidating several existing training grants and providing a centralized direction to coordinate the activities in these departments in the area of occupational safety and health. We currently support professional graduate academic programs; Industrial Medicine, Industrial Hygiene, Industrial Safety and Industrial Nursing, and have 85 graduate students enrolled in these programs. Before the reduction in federal funding in 1981, we were also able to support programs in Epidemiology and Biostatistics. A recent survey of our graduates that was done by NIOSH shows that over 95% of our alumni have remained in and are currently active in the field of Occupational Health. About half of these are employed by industries and are in positions in which they can contribute to policy decisions which affect the health and welfare of employees. On average, they each claim to be responsible for the health and safety of between 50 and 1000 workers. In general, they express a high degree of satisfaction with their vocation and with the training that they received at the University.

In addition to our academic programs, we have made a considerable investment in providing continuing education to those people who are already employed in the field and may have a part-time responsibility for health and safety. We currently enroll approximately 1000 students each year in our continuing education program. In addition to the many programs that we offer throughout the year, we have been conducting a Summer and Winter Institute consisting of 10 to 15 courses which are offered concurrently over a period of five days. These institutes have been well accepted by the community and have been averaging approximately 250 registrants for each session. The investment made by NIOSH in these continuing education programs is quite modest, but does provide a basic salary support for the staff which organizes and conducts the institutes. Our overall budget for all of our continuing education activities is over $300,000 annually. The NIOSH contribution is approximately $60,000 but with this small contribution, we are able to provide over five times the amount of training to practitioners in the field. It must be recognized however, that without the initial support by the Agency that these C.E. programs could not exist.

Perhaps one of the most important benefits of our interaction with the Federal Agency is the opportunity to engage in collaborative efforts. On many occasions, the University has been able to provide an avenue for the testing and the implementation of novel NIOSH programs. On the other hand, NIOSH has been able to suggest new concepts and initiatives that are within our own objectives and have been quite beneficial to our faculty and to our students. I believe that our progress and accomplishments have been great over the past eight years. We are now however, on the threshold of being able to capitalize on the relationships which have been established and to build into permanency these collaborative efforts between the governmental agency and the universities. This is probably the single most important contribution that can be made to the health of the American worker and we ask for your continued support in these efforts.

Once again, I want to thank you for the opportunity to bring these matters to your attention.

SOUTHERN CALIFORNIA EDUCATIONAL RESOURCE CENTER
FOR OCCUPATIONAL SAFETY AND HEALTH,
Los Angeles, CA, July 12, 1985.

Hon. JOSEPH M. GAYDOS,
Chairman, Subcommittee on Health and Safety, Committee on Education and Labor, Congress of the United States, House of Representatives, Washington, DC.

DEAR REPRESENTATIVE GAYDOS: The Southern California Educational Resource Center welcomes this opportunity to supplement the testimony you heard concerning the NIOSH-supported Educational Resource Centers from Drs. Robert Spear, Jeff Lee, Morton Corn, and Steven Levine on June 18, 1985 at the House of Education and Labor Committee meeting.

The Region IX The Southern California Educational Resource Center, centrally administered at the Institute of Safety and Systems Management at the University of Southern California, consists of 10 distinct, yet interrelated, programs in four separate locations: The University of Southern California, Master of Science in Occupational Safety and Health and Continuing Education; the University of Southern California School of Medicine, Master of Science in Occupational Medicine; University of California, Los Angeles, Master of Science, Master of Public Health and Ph.D. in Industrial Hygiene; the University of California, Irvine, medical residency in Occupational Medicine, Continuing Education, and Occupational Health Nurse Certificate program; and California State University, Fullerton, Bachelor of Science in Nursing with occupation health content.

In addition to the core programs, an ergonomics option is currently in the final stages of approval and preparation for the development of a hazardous waste management option has begun at the University of Southern California.

The faculty within each of the representative programs actively participate in occupational safety and health endeavors which encompass a wide range of influence, from local to state to national to international levels. Hence, the expertise and influence of these individuals at the Educational Resource Centers serve as an invaluable resource for the health and safety needs of the entire country. NIOSH funding has played a major role in attracting such distinguished and knowledgable faculty to the Educational Resource Centers. Although not supported by Educational Resource Center funds, the University of Southern California is able to offer an undergraduate program with a major in safety. The existence of renowned quality faculty as a result of the presence of the Educational Resource Center, and the support it provides to the graduate program, allows for viability of the undergraduate program.

Current research efforts at the Southern California Resource Center include, but are not limited to, the following areas: hazard control; cancer and the workplace; airborne contaminants; traumatic injuries and fatalities; occupational disease risk technological changes and expansion as related to Occupational Safety and Health, have the knowledge and resources to educate and train professionals in the prevention and control of everyday occurrences from minor occupational illnesses and traumatic injuries to large-scale disasters such as Bhopal, the asbestos situation, and similar type tragedies.

Continuing education is a significant component in the Southern California Educational Resource Center. In the past year alone, from July 1, 1984 to June 30, 1985, 54 continuing education courses were conducted with an enrollment of 1437 individuals. These figures attest to the educational need of occupational safety and health professionals. Enclosed is the 1985–86 Educational Resource Center Continuing Education catalog which describes all of the continuing education courses offered by the 14 Education Resource Centers.

The progress which has been made in the field of occupational safety and health since the establishment of NIOSH Educational Resource Centers has been perceived and experienced as highly significant by those of us who are directly and actively involved with the field. We are acutely aware of the expressed need of practicing professionals to remain current with new technological, scientific, and regulatory developments. We are fully cognizant of the need for additional and continuing research in the establishment and identification of causal relationships between occupational exposure and subsequent disease and injury.

Any situation which might jeopardize the gathering momentum of the Educational Resource Centers at this juncture would be unfortunate, especially considering the definitive and positive influence the Educational Resource Centers have had, in the relatively short period of time of their existence, on safety and health in the workplace in this country.

Your thoughtful consideration of the Educational Resource Centers and their societal impact is most appreciated.

Sincerely,

JAMES O. PIERCE, Sc.D.,
Professor and Director.

PREPARED STATEMENT OF EDWARD J. FAIRCHILD II, PH.D., DIRECTOR, TEXAS OCCUPATIONAL SAFETY AND HEALTH EDUCATION RESOURCE CENTER, THE UNIVERSITY OF TEXAS HEALTH SCIENCE CENTER AT HOUSTON

The University of Texas Health Science Center at Houston is headquarters for the Texas Occupational Safety and Health Educational Resource Center with training programs in occupational medicine, industrial hygiene, occupational safety, and ancillary support programs in occupational health epidemiology and industrial toxicology.

The Educational Resource Center (ERC) activities in Houston are primarily located in the School of Public Health, but with coordinated efforts also at the University of Texas Medical School and Nursing School. Some teaching activities are also done in cooperation with the University of Houston, Rice University, Baylor College of Medicine and Texas Woman's University. The ERC Director is Dr. Edward J. Fairchild, Professor of Toxicology in the School of Public Health, while Dr. Marcus Key is Program Director of Occupational Medicine and Professor James Hammond heads the Industrial Hygiene Program.

Integral components of the ERC, specifically safety engineering and industrial hygiene engineering, are located 100 miles north of Houston at Texas A&M University. Drs. Richard Konzen and Ralph Vernon direct these programs, as a part of a subgrant with the University of Texas.

The UT School of Public Health programs offer graduate training with the M.S. and M.P.H. degrees in industrial hygiene, the M.S. and Ph.D. degrees in either industrial toxicology or occupational epidemiology, as well as an M.P.H. academic year residency in occupational medicine and an in-plant residency year in this specialty. The Texas A&M programs in the College of Engineering, Department of Industrial Engineering, offer the B.S. and M.S. degress in safety engineering, the M.S. in industrial hygiene, the Ph.D. in industrial engineering.

The teaching and research activities of the Occupational Health and Aerospace Medicine Module (the Convener being Professor Fairchild) are closely interrelated with the teaching and research of the Environmental Sciences Discipline (the Convener is Assoc. Prof. J.D. Theiss) all located in the School of Public Health. This modular/discipline approach is, in turn, closely inter-related to other modules and disciplines within the School, e.g., epidemiology, biometry, disease control, international health, community health and others. In addition, there is some limited interrelated training between the programs at the School of Public Health in Houston and at Texas A&M University at College Station, Texas. As an example, Drs. Fairchild, Key and Pier of the Occupational Health and Aerospace Module in the School of Public Health have cross-teaching appointments at Texas A&M, while Drs. Konzen and Vernon of the Industrial Engineering Department at Texas A&M have similar appointments in the School of Public Health in Houston. Moreover, one of the Associate Professor faculty at Texas A&M (this being Dr. Way Johnston) teaches a course at the School in Houston in Human Factors Engineering. In this manner, students in occupational health oriented programs in Houston can obtain limited exposure to safety engineering principles, whereas, lectures by Drs. Fairchild, Key and

Pier to students at Texas A&M serve to introduce their students to certain aspects of medicine, toxicology, epidemiology, etc. pertinent to comprehensive and state-of-the-art training.

The Texas ERC, like the other ERCs involved with the NIOSH/CDC Training Grant program, believes that training, and trainees produced, from the multiplier effect of such activities has definitely helped to impact upon the occupational safety and health profession in the United States. Approximately 75 percent of the students who have gone through the programs at the University of Texas and Texas A&M University (as graduates in occupational health and/or safety related curricula) have gained employment in occupational safety and health fields. Of these numbers, approximately one-half have gone to industries, while government, academia, trade associations, insurance companies and hospitals have employed the other half. Moreover, it is noted that prior to organization of an ERC at the University of Texas (Houston), there were very few students being trained in industrial hygiene, industrial toxicology and occupational epidemiology, although there was some training in occupational medicine. Texas A&M University, on the other hand, has had competent training in the engineering aspects associated with occupational safety and health; however, the advent of the ERC undoubtedly permitted certain expansion in those activities, as well as significant increase in continuing education activities.

It should be pointed out that the first five years of the Texas ERC saw the beginning, then decline, of an occupational health nursing program. There is indication from industry contact that a need for OH nursing training is being felt, but the ERC plans to apply for grant support only if a survey currently being conducted (summer 85) gives evidence of the need.

The petrochemical complex and associated industries of the gulf coast area of our region, combined with the multidisciplinary medical research and service of the Texas Medical Center in Houston, present many opportunities for the Texas ERC, and is a fertile consumer of the end product of an occupational safety and health training center. For these same reasons, a program in continuing education (as part of the Texas ERC) had been developed recently; even though austere times have hampered expansion programs in occupational safety and health, particularly in the energy related industries, continuing education activities for the safety and health professions is presumed to still have an important place. Accordingly, the Texas ERC hopes to expand in this area of education, although the primary purpose of the ERC will always remain as teaching and research in graduate education.

Examples of the continuing education activities are listed below. Also, outreach activities, i.e., assistance to other educational institutions, local government, trade unions, etc., in the region, have received some attention in these very same categories of training, or suggestions for training:

Short Courses: Identification of Occupational Health Hazards; Management of Industrial Hygiene Programs; Health & Safety Hazard Communications; Respiratory Diseases; Ergonomics; Computer Technology for Occupational Safety & Health Programs; Laboratory for Safety and Health; Industrial Radiation Protection; Medical Surveillance of the Occupational Environment; Systems Safety & Industrial Hygiene; Industrial Hygiene Mini-Conference; and Indoor Air Pollution.

Long Term Courses: Principles of Industrial Hygiene—A Review Course; Principles of Occupational Health Nursing—A Review Course; Introduction to Occupational Health (Industrial Hygiene, Industrial Toxicology, and Occupational Epidemiology).

The major continuing education activity of the Texas ERC involves the annual Construction Safety Engineering Summer Institute which is conducted at Texas A&M University, College Station, Texas; the College of Engineering and the College of Architecture work together on this, thus presenting each year a highly successful summer effort of training in this important area of safety and health.

A brief statement should be included here to address something about financial matters involving the Texas ERC. It, presumably like other ERCs, cannot possibly carry on the training activities (let alone some meager research support) without the NIOSH/CDC monetary inputs. Even though most faculty support (salary) comes from State, e.g., 100 percent for Drs. Buffler, Fairchild, Key, Theiss, and 50 percent for Drs. Konzen and Vernon, neither of our institutions would be able to offer such comprehensive programs in occupational safety and health without the finances that have come from Federal Government. Admittedly austerity has hampered the growth of ERC program activities, but, by the same token, the last few years of recession would have seen this ERC, and probably all of the others, "dead on the vine" had not the funding, even though increasingly diminished, come forth. It has been hinted, and even blatently stated by some, that the private sector should have picked up by now in order to secure funding of the ERCs, but it is generally believed by those of us in the business of eduation that such will never happen. Who knows, since this may go hand in hand with the seemingly greater propensity for letting up on awareness of health and safety matters, which could only be to the detriment of one of the most precious commodities of this (or any other) country—it's working populations.

PREPARED STATEMENT OF JOHN T. WILSON, JR., M.D., ScD., DIRECTOR, NORTHWEST CENTER FOR OCCUPATIONAL HEALTH AND SAFETY, SCHOOL OF PUBLIC HEALTH AND COMMUNITY MEDICINE, UNIVERSITY OF WASHINGTON

SUBJECT: THE IMPACT OF THE OCCUPATIONAL SAFETY AND HEALTH TRAINING PROGRAMS IN THE PACIFIC NORTHWEST

Mr. Chairman and members of the committee, I welcome the opportunity to present to you this written testimony concerning the importance of the NIOSH-supported training programs in occupational safety and health and the impact these programs have had within our region, which includes Washington, Oregon, Idaho and Alaska.

INTRODUCTION

The University of Washington has long enjoyed the support of the State of Washington in the field of Occupational Health and Safety. Basic State funding was established for the development and staffing of the Environmental Research Laboratories in 1962. At that time, a long-standing relationship was established with the Department of Labor and Industries, which enforces occupational health and safety standards within the State. Under state support, the University provided both technical training and continuing education for occupational health specialists in the State Department of Labor and Industries. Periodically, seminars and short courses were offered on selected topics in industrial hygiene and safety. However, graduate training started later and progressed more slowly. Although five occupational health nurses were trained in a graduate program in the school of nursing, the program ceased in the early 60's due to lack of support. Graduate training in industrial hygiene and occupational medicine started in the early 70's. Each of the three programs suffered because of uncertain funding, and reliable student support could rarely be offered.

Importance of NIOSH support

The establishment of Educational Resource Centers enabled programs such as ours to survive. While the major use of the training funds in the Educational Resource Center has been for student support, these monies have also permitted us to expand our continuing education program and extend our outreach efforts to Alaska, Oregon and Idaho. It also encouraged the development of a close relationship between the occupational health nursing program, the industrial hygiene and safety and occupational medicine programs.

In recounting the past, I want to emphasize that the foundation provided by State support for faculty, equipment and operating resources was substantial benefit and was also basis upon which to build the Education Resource Center programs.

I will direct my remaining remarks toward a brief review of our programs, with emphasis on the accomplishments of our graduates, the continuing education program and the impact of our outreach activities in the region we serve.

Our Industrial Hygiene and Safety program is unique in that all graduate students receive training in both disciplines. The students participate in a combination of classroom instruction, field experience, and laboratory research. The aim is to combine the benefits of a practical orientation with a strengthened emphasis on scientific research to assure that students are qualified for supervisory positions in industry or government and are also well prepared for further graduate study. Such training seems to fill the needs in this region, especially for small and medium-sized establishments. Since I believe that the success of our graduates is an important measure of achievement for our Center, I am happy to tell you that our graduates hold responsible positions in health and safety programs in our region. They are widely sought by government and industry.

The Occupational Health Nursing program prepares graduate nurses for leadership and clinical roles in the delivery of occupational health services. Six of the eight nurses in the region with graduate degrees in occupational health nursing were trained by our program. Each one has made important contributions locally and regionally, and several have won national and international attention for their research efforts.

The Occupational Medicine Residency program is a two-year thesis program which awards a Master of Public Health degree. This accredited residency provides both academic and practical experience with training in private and hospital-based occupational health clinics, in industry, and in conducting field studies. Our graduates have more than doubled the number of those having graduate training in occupational medicine in this region. Among their accomplishments is the establishment of monthly grand rounds which has become a focal point for occupational medicine in the region. The sessions are well attended by physicians from other Departments and the community, as well as by physicians, nurses, and industrial hygienists from our Center.

Most of our occupational health graduates are deeply involved in community and professional organizations in the region. Many of them hold leadership roles in the Northwest Occupational Health Nurses Association, Northwest Association of Occupational Medicine, and the Pacific Northwest Section of the American Industrial Hygiene Association, to name a few. Through their community service our graduates demonstrate a commitment to protecting the health of the worker.

Continuing education

Since its inception, the continuing education program has provided training through short courses and seminars for thousands of occupational health and safety professionals, with over 1200 attending last year. This excellent interdisciplinary program offers 15–20 courses each year, covering most aspects of occupational health and safety. Attendees came from 19 states and provinces, with the majority from the Pacific Northwest, British Columbia and California. Many of these attended our major national conferences on office hazards, ventilation and hazards to health care workers.

The quality of the faculty is one of the distinguishing characteristics of the program. In addition to ERC faculty, a special effort is made to involve others at the University of Washington, including faculty from the School of Engineering, the Department of Architecture, the School of Pharmacy and the School of Medicine. This interaction serves to increase their interest and knowledge in the field of occupational health.

The Continuing Education program also has strengthened the Center's relationship with important groups in the community. The Washington State Labor Council co-sponsored a conference and contributed money for development of a play on hazards in the office environment which was later shown to community groups. Another course on occupational hazards to health care workers was co-sponsored by Group Health Cooperative of Puget Sound.

Outreach activities

The purposes of outreach is to assist other educational institutions by providing lectures, curriculum materials and consultation for course development and to increase awareness and understanding of occupational safety and health issues throughout the region. The Department of Environmental Health and the School of Nursing have longstanding service orientations. While the outreach activities of this Center are too extensive to go into in great detail, some examples can be given to emphasize the breadth of this activity.

Consultation has been provided, 1) to four nursing schools in the form of assistance with curriculum or student placement, 2) to local health departments regarding occupational health and safety questions, 3) to hospitals with occupational health programs or to those planning similar programs, and, 4) to industries and governmental agencies having need to develop or improve their occupational health programs.

Under a special contractual arrangement with NIOSH, the Department has implemented Project Minerva in the Pacific Northwest. The goal of this NIOSH sponsored project is to develop an increased awareness of occupational health and safety principles in the business schools in the region. We have contacted 12 universities in the Pacific Northwest and most are interested in receiving curriculum materials on occupational health and safety. Over half have indicated their intention to increase occupational health and safety content in their courses, and four have promised to do this within the year. These activities should have a substantial future impact on occupational health and safety in this region.

In conclusion, I would like to emphasize that none of these achievements would have been possible without a staff and faculty of truly dedicated occupational health and safety professionals. These persons have all of the credentials, affiliations, research orientation and dedication to service that one would expect to find in major university. With the assistance of NIOSH funding, the Northwest Center for Occupational Health and Safety has become a significant source for occupational health and safety in our region.

Mr. Chairman, thank you for this privilege to present these thoughts to you and members of the committee.

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